



Energy, Mines and
Resources Canada

Energie, Mines et
Ressources Canada

CANMET

Canada Centre
for Mineral
and Energy
Technology

Centre canadien
de la technologie
des minéraux
et de l'énergie

MINTAB USER'S GUIDE - A MINING SIMULATOR FOR DETERMINING THE ELASTIC RESPONSE OF STRATA SURROUNDING TABULAR MINING EXCAVATIONS (ASCII 77 Version 4.0, 1982)

by

Y.S. Yu, N.A. Toews and A.S. Wong
Rock Mechanics Laboratory

March 1983

This document is an unclassified
internal report prepared for the
the University and the
reporting purposes. It does not
represent a final view
the opinion of the Council
for Mineral and Energy Technology
(CANMET)

Ce document est un rapport
interne non classifié et rédigé
pour le compte de la
la documentation
et n'est pas
la décision de
le Centre canadien de
la technologie des minéraux et de
l'énergie (CANMET)

71 pp

MINERALS RESEARCH PROGRAM
MINING RESEARCH LABORATORIES
DIVISION REPORT MRP/MRL 83-25(TR)

MICROMEDIA

JUL 29 1983

ALCANTARA

© 1992

CONTENTS

	<u>Page</u>
INTRODUCTION	1
GENERAL REMARKS	2
MODIFICATIONS OF MINTAB	2
SIGN CONVENTION AND SYSTEM OF UNITS	9
COMPUTER MEMORY REQUIREMENTS	11
DATA INPUT INSTRUCTION	11
CONTENTS OF SAVE FILE - 'SAVE'	23
OFF-REEF STRESS/DISPLACEMENT CALCULATIONS	24
Co-ordinates of off-seam points	24
Data input instruction for OFREEF	28
EXAMPLE PROBLEM	30
ACKNOWLEDGEMENTS	41
REFERENCES	41
APPENDIX	A-1

FIGURES

No.

1. The coordinate system on surface plane (global) and in the reef or seam plane (local)	3
2. Discretization of the mining horizon in the plane $Z_r=0$	5
3. Sign conventions (a) displacement components and (b) stress components	10
4. Example of specified off-seam stress/displacement locations	25
5. Section and plane view showing selected-off-seam stress points	27
6. Diagram showing the sequence of mining for the example problem	32
7. Mining step information	33
8. Complete input for the example problem (initial run)	36
9. Input for the example problem (restart run)	37

FIGURES (cont'd)

<u>No.</u>	<u>Page</u>
10. Example input required for off-seam stress/displacement calculations	38
11. Control cards required to execute MINTAB.....	39
12. Control cards required to execute OFREEF	40

**MINTAB User's Guide - A Mining Simulator for Determining the
Elastic Response of Strata Surrounding Tabular
Mining Excavations (ASCII 77 Version 4.0, 1982)**

by

Y.S. Yu*, N.A. Toews* and A.S. Wong**

INTRODUCTION

MINTAB is a computer program developed for analyzing pillar extraction scheme in a tabular orebody which is flat-lying or dipping at any angle up to 90° to the horizontal. The program is based upon the displacement discontinuity technique. The mathematical background of this technique has been described in detail (1,2,3).

This program was originally developed at Consolidated Goldfields Corporation in South Africa by S.L. Crouch. The Mining Research Laboratories (MRL) obtained a copy of this program through the courtesy of Consolidated Goldfields Corporation and the mining companies (Rio Algom Ltd., and Denison Mines Ltd.) at Elliot Lake. To meet requirements for our Canadian mining conditions the program has been extensively modified, including dynamic dimensioning of data arrays, restart capability, arbitrary initial stresses, compressibility of pillars or intact elements, linear backfill capability and a new procedure to calculate off-seam stresses and displacements. The program MINTAB was rewritten in accordance with ASCII 77 Fortran Standard. In addition a post-processor has been developed for interpreting results.

*Research scientists and **Physical scientist, Mining Research Laboratories, Canada Centre for Mineral and Energy Technology, Energy, Mines and Resources Canada, Ottawa

This report supersedes the previous report MRP/MRL 81-131 (4). It documents some recent modifications made to the MINTAB program and it also provides data input instructions and serves as a user's guide. A simple example is also shown for running MINTAB on the Departmental CYBER 730 Computer System.

GENERAL REMARKS

The mathematical formulation upon which MINTAB is based have been presented by Starfield and Crouch, and others (2,3). An effort to derive the mathematical expressions of interest was also conducted independently at MRL, so that the MINTAB program would be thoroughly checked to ensure accuracy.

Essentially, this analytical technique deals with extraction of a relatively thin plane deposit which may have any orientation relative to the ground surface. It is assumed that the mine workings are sufficiently deep so that the influence of the surface on stresses and displacements near the mine workings can be neglected. As shown in Fig. 1, the seam or reef (orebody) with a thickness 't' is dipping at an angle to the horizontal and is located at some distance below the surface. The thickness t of the orebody is small compared to its lateral extent and the depth below the surface. Therefore, the seam or reef can be viewed as a simple plane crack of negligible thickness. Figure 2(a) shows the discretization of the mining horizon in the plane $Z_r = 0$. The region of interest in the mining horizon is divided into a number of large squares. A typical large square is identified by its row number I and its column number J as shown in the Fig. 2(a). A typical large square is further divided into 5 x 5 small squares as shown in Fig. 2(b). A small square within a given large one is identified by a row number K and a column number L as shown.

MODIFICATIONS OF MINTAB

As mentioned earlier MINTAB has been rewritten in accordance with ASCII 77 Fortran Standard to enhance its portability. In addition a number of modifications have been made and incorporated into the MINTAB program:

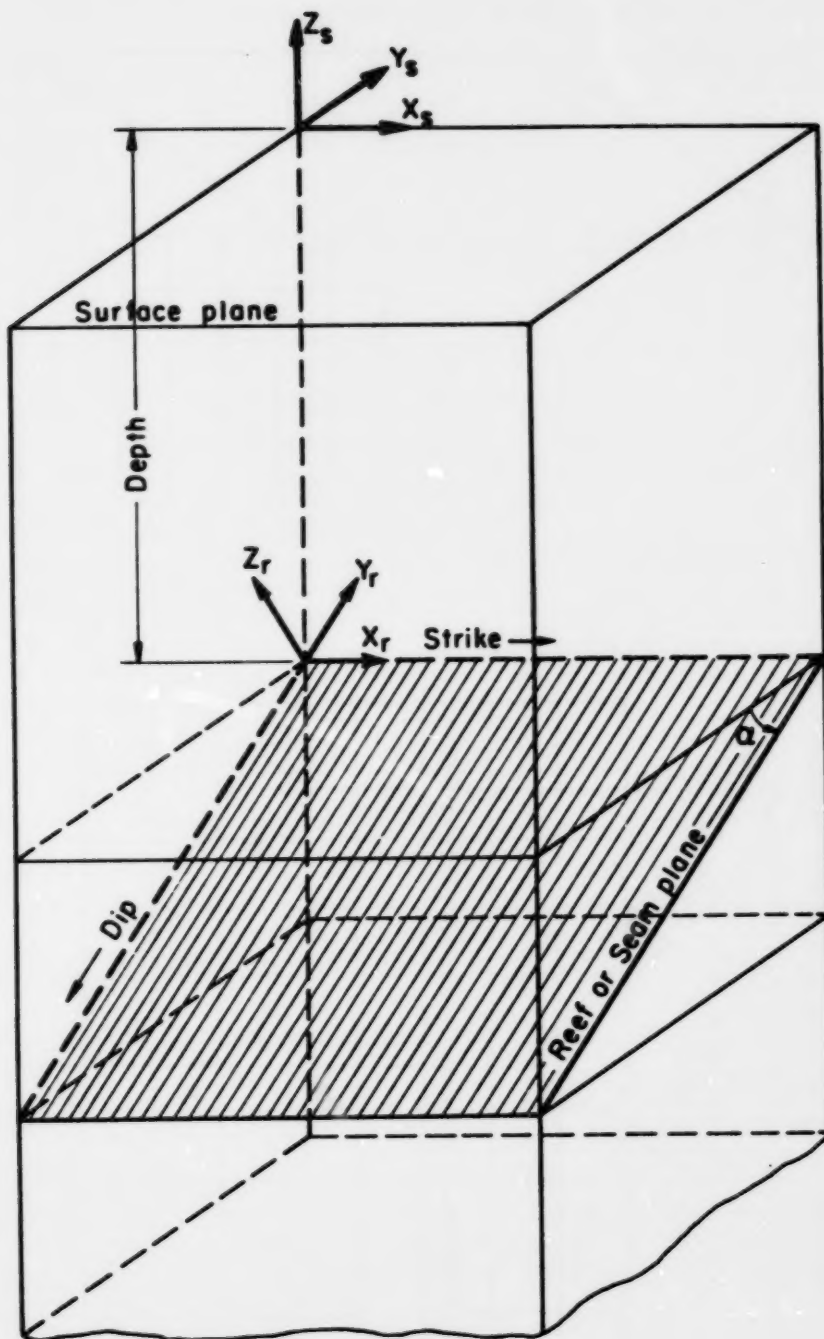


Fig. 1(a) - The coordinate system on surface plane (global) and in the reef or seam plane (local): positive Z_r is directed into the hangingwall and the dip angle is α

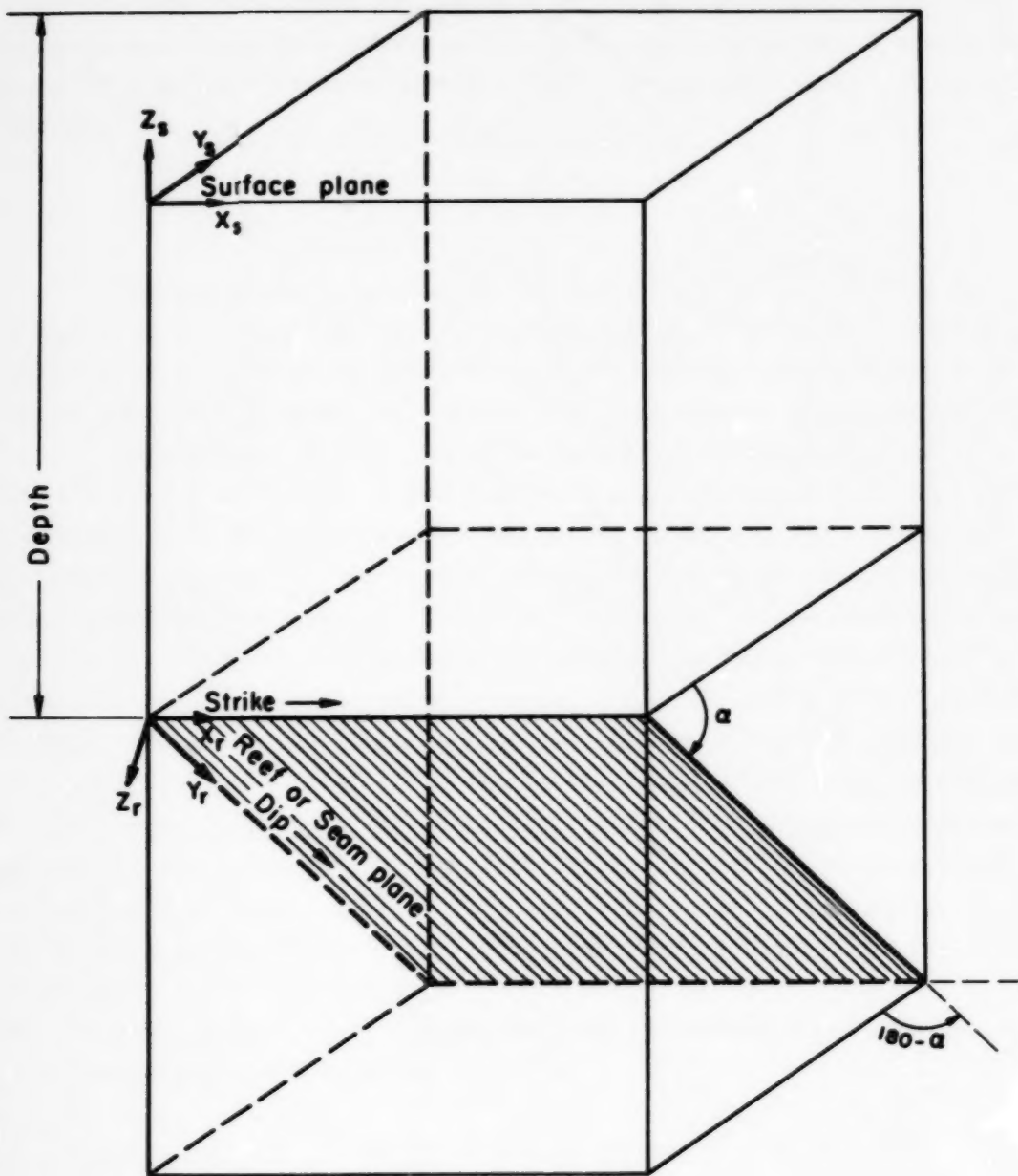


Fig. 1(b) - The coordinate system on surface plane (global) and in the reef or seam plan (local): seam dips away from an observer's eye and z_r is directed into the footwall; the angle $(180 - \alpha)$ is to be used as dip angle

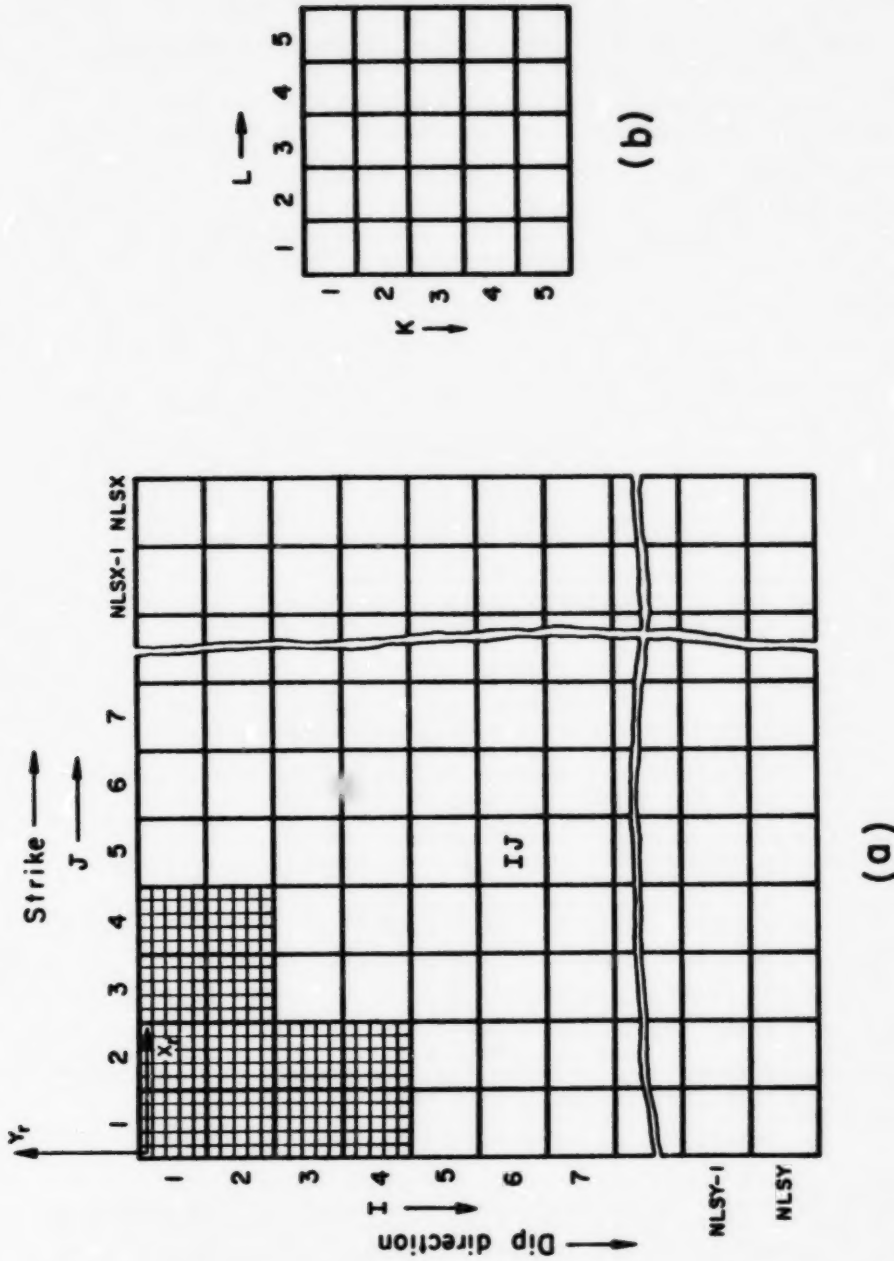


Fig. 2 - Discretization of the mining horizon in the plane $Z_r = 0$;

(a) large squares, NLSX and NLSY are the maximum number of large squares in X_r and Y_r direction respectively, and

(b) a typical large square IJ, which is further divided into 5 x 5 small squares

- (a) Dynamic dimensioning of MINTAB data arrays was introduced so that the program memory requirement can be kept to a minimum. The mine grid, at present, is expanded to 6400 elements, i.e., 80 elements in the x-direction and 80 elements in the y-direction. A mine grid of 80 x 80 should be sufficient for most mining applications.
- (b) The compressibility of pillars or intact elements (unmined portions) have been taken into account and implemented in the present version of the program.
- (c) A linear backfilled element has also introduced. The characteristics of a backfill element (small squares) can be stated briefly as follows:
 1. Freshly placed backfill does not carry any stress until it is compressed by roof/floor closure that accompanies subsequent mining activities. As an illustrative example, the newly placed backfill in stope No. 1, as shown in Fig. 6 (p. 31), is stress free until stope No. 2 is excavated (mining step No. 2). Similarly the backfill in the upper portion of stope No. 2 will remain unstressed until the upper portion of the pillar is extracted.
 2. From the viewpoint of simulation the mining cycle is carried out by backfilling first and followed by excavation if excavating and backfilling are taking place at the same time.
 3. The stresses transmitted across a backfilled element (small square) will depend upon the closure and ride components that occur at the element after the fill has been stowed into place.
 4. The relationship between the stress and closure/rides for the backfill material is assumed to be linearly elastic. Thus the backfill can be defined by the material constants K_n and K_s , where K_n and K_s are the normal and shear stiffness respectively.
 5. The pore pressure of backfill, if hydraulically placed, has not been taken into account.
- (d) Arbitrary initial stress fields have been incorporated. The program was modified to accept arbitrary initial stresses. The initial stresses are assumed to be in the form of:

$$\sigma_{xx} = a_{xx} + b_{xx}.Z$$

$$\sigma_{yy} = a_{yy} + b_{yy}.Z$$

$$\begin{aligned}\sigma_{zz} &= a_{zz} + b_{zz} \cdot Z \\ \tau_{xy} &= a_{xy} + b_{xy} \cdot Z \\ \tau_{yz} &= a_{yz} + b_{yz} \cdot Z \\ \tau_{xz} &= a_{xz} + b_{xz} \cdot Z\end{aligned}$$

Where σ_{xx} , σ_{yy} τ_{xz} are the six stress components defining a complete three dimensional stress field in a global co-ordinate system. a_{xx} , b_{xx} ... a_{xz} , b_{xz} are the coefficients relating the stresses to depth ($-Z$) of a point under consideration.

- (e) A restart capability has been incorporated. This is considered a useful feature in simulating large mine grids with multiple sequences of mining. It allows the user to examine stress/displacement step by step or to modify input data of a particular mining step (sequence) without repeating calculations of the previous mining step(s). In addition, this also removes the restriction in earlier versions that only a maximum of nine mining steps are permitted.
- (f) Off-seam stress/displacement calculations are separated from the main program. Routines associated with off-seam stress/displacement calculations have been separated from the main program and have been rewritten in accordance with ASCII 77 Fortran Standard. It is renamed as OFREEF. Now it stands alone and is considered as a 'post-processor'. The reason for this is that when additional information for off-seam locations, other than those already specified, is required, there is no need to rerun the whole MINTAB program but only the OFREEF routine. Thus it reduces computing costs. In the original version of MINTAB (as received from the mines) the numerical solution procedure is not very stable when one attempts to calculate stress and displacement at locations which are very close to the seam plane, i.e., in the immediate area of roof or floor, large errors are observed. In order to correct this situation rides and closure are no longer assumed to lie only at the centre of an element but to be distributed uniformly over an element. This procedure for off-seam stress/displacement calculations is based on the work of J.P.E. Moris, Chamber of Mines of South Africa (3). When this is done stresses and displacements calculated at the centre of an element no

longer have a singularity, thus it is possible to calculate displacements and stresses anywhere in the rock mass including points located in the seam.

- (g) A post-processor was developed to provide graphical representation of results obtained from the execution of MINTAB program.

The capabilities and limitations of the MINTAB can be summarized as follows:

Capabilities:

- a) Complex stope-and-pillar or any mining geometries in a tabular orebody can be simulated inexpensively.
- b) Any number of mining sequences or steps (extraction/backfill, etc.) can be easily modelled.
- c) Linear compressibility of pillars, remnants or abutments can be simulated.
- d) The seam deposit and the rock mass can have different material properties.
- e) Linear behaviour of the backfill material can be modelled.
- f) Arbitrary initial stress fields can be taken into account.

Limitations:

- a) Elastic behaviour of orebody and surrounding rocks has to be assumed.
- b) The region outside the mine grid is still considered incompressible.
- c) Pillar yielding or fracturing cannot be simulated. In addition, support systems such as rock bolts cannot be modelled.
- d) The mine must be sufficiently deep so that the ground surface will not influence the results.

Within these limitations, the model provides another means of evaluating stresses and displacements induced by mining a tabular orebody. It is relatively inexpensive to run and should prove useful for certain mining applications.

SIGN CONVENTIONS AND SYSTEM OF UNITS

The following sign conventions are used in this report:

Displacements U_x , U_y and U_z are positive if they pointed in the positive directions of X_r , Y_r and Z_r axes respectively (Fig. 3(a)).

The rides (D_x , D_y) and closure (D_z) are defined as:

$$D_x = U_x(Z_r=0_-) - U_x(Z_r=0_+)$$

$$D_y = U_y(Z_r=0_-) - U_y(Z_r=0_+)$$

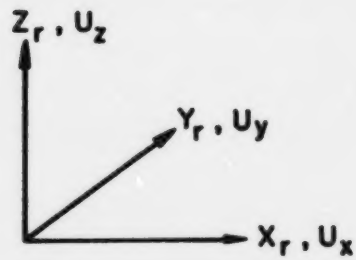
$$D_z = U_z(Z_r=0_-) - U_z(Z_r=0_+)$$

When the dip angle α is less than 90° , i.e., orebody is dipping toward the observer as shown in Fig. 1(a), $Z_r = 0_+$ and $Z_r = 0_-$ represent the roof and the floor of a seam respectively; when the orebody is dipping away from the observer's eye and the angle $(180 - \alpha)$ is considered as the dip angle as shown in Fig. 1(b). In this case, $Z_r = 0_+$ and $Z_r = 0_-$ represents the floor and roof of a seam respectively. A positive value of D_z indicates an excavation being closed or compression of the seam material.

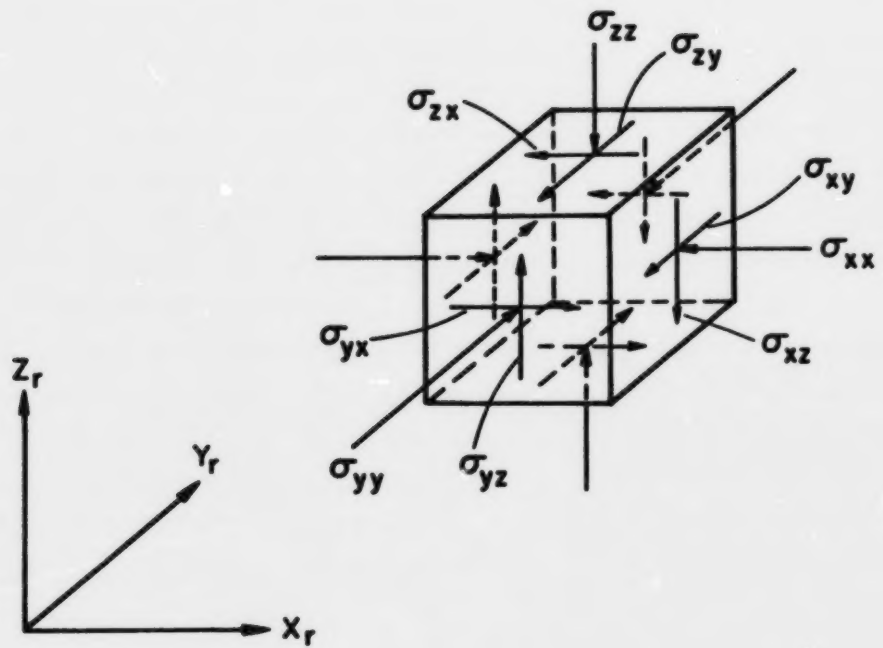
It is desirable for mining applications that the convention that compressive stresses are positive be adopted. To achieve this all stresses including shear stresses are reversed in sign. The normal stresses and the shear stress components are shown in Fig. 3(b).

The program will accept any consistent system of units. However, the input/output format is basically designed for the SI system. Therefore, SI units are suggested.

Modulus of deformation	MPa
Unit weight of rock	MN/m ³
Size of grid elements	m
Stopping thickness	m
Poisson's ratio	dimensionless
Energy released	MJ/m ²
Stresses	MPa
Displacements (rides, closure)	m



(a)



(b)

Fig. 3 - Sign conventions (a) displacement components and (b) stress components

COMPUTER MEMORY REQUIREMENTS

Necessary storage requirements depend on the problem being analyzed. The storage assigned for a given problem is controlled by the dimension of blank common A and the value assigned to MXDIM as set in the main program (MINTAB). These statements are:

```
COMMON A (n)
```

```
MXDIM = n
```

The value of n required for a particular problem may be calculated as follows:

$$n = 100 * NLSX * NLSY + 4 * MAXELR + 3 * MAXBF$$

in which NLSX is the number of large squares in x-direction and is limited to a maximum of 16. NLSY is the number of large squares in y-direction and is also limited to 16. MAXELR is the maximum number of elements or squares to be removed in any one mining step after the first one; MAXBF is the maximum number of backfill elements.

The core memory required by the program itself for the CDC CYBER 730 is approximately 44,000 octal. If the calculated $n = 29171$ in decimal ($NLSX = NLSY = 16$, $MAXELR = 226$ and $MAXBF = 889$), which is equal to 70,763 in octal. The total central memory required to run this job on the Departmental CYBER 730 system is 134,763 or approximately 135,000 octal.

INPUT DATA INSTRUCTION

The input data for the MINTAB program, is grouped as follows:

1. Title cards (3 cards, for identification only; compulsory).
2. Job control parameters (1 card, compulsory).
3. Grid control parameters (1 card, compulsory).
4. Pre-mining stress information (6 cards, compulsory).
5. Solution convergence control data (1 card, compulsory).

6. Material properties (2 cards, compulsory).
7. Restart file information (1 card, optional).
8. Mining step information (3 cards, compulsory).
9. Mining pattern information (including excavation, backfill etc., and print control; variable).

Note 1: 'Variable' in the above means that the number of cards in the category is not fixed but is problem dependent.

Note 2: The terminology 'card' is used to denote one record of the input data.

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
1.0		Title cards (3 cards, compulsory). The following cards provide identifying information that will be reproduced on the computer listing.	
1.1	1	MINAME MINAME - name of the mine to be studied.	(20A4)
1.2	1	JOBDES JOBDES - a short description of the study	(20A4)
1.3	1	DATE DATE - date (day/month/year) on which this study is being done or any other information.	(20A4)
2.0		Job control parameter card.	
2.1	1	ISTART, ISTEPST, ISTPI, ISTEPF ISTART - restart indicator = 0, implies that this is an initial job. ≠ 0, implies that this is a restart job with restart information to be read from logical file 'RESTRT' ISTEPST - is the mining step number residing on the restart file (RESTRT), which will provide the starting information for the current job.	(415)

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
		ISTPI - is the step number of the first mining step in current job.	
		ISTPF - is the step number of the final mining step in current job.	
3.0		Grid control parameters.	
3.1	1	NLSX, NLSY, EW, DEPTH, ALF, HO	(215, 4F10.0)
		NLSX - the number of large squares in x-direction ($2 \leq \text{NLSX} \leq 16$).	
		NLSY - the number of large squares in y-direction ($2 \leq \text{NLSY} \leq 16$).	
		EW - the width of small square or element in metres.	
		DEPTH - depth of the first row of the grid (small squares) below the ground surface, in metres.	
		ALF - dip angle of the seam in degrees.	
		HO - stoping thickness in metres.	
4.0		Pre-mining stress information: arbitrary three-dimensional in situ stresses can be input. Twelve (12) coefficients are required to define the state of 3-dimensional stresses.	

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
4.1	1	AXX, BXX	(2E15.6)
4.2	1	AYY, BYY	(2E15.6)
4.3	1	AZZ, BZZ	(2E15.6)
4.4	1	AXY, BXY	(2E15.6)
4.5	1	AXZ, BXZ	(2E15.6)
4.6	1	AYZ, BYZ	(2E15.6)

The definition of these coefficients can be illustrated by the following equations representing the initial stress field.

$$\sigma_{xx} = AXX + BXX * Z$$

$$\sigma_{yy} = AYY + BYY * Z$$

$$\sigma_{zz} = AZZ + BZZ * Z$$

$$\tau_{xy} = AXY + BXY * Z$$

$$\tau_{xz} = AXZ + BXZ * Z$$

$$\tau_{yz} = AYZ + BYZ * Z$$

For example, under a gravitational loading the vertical stress σ_{zz} is due to the weight of overburden and the horizontal stresses (σ_{xx} and σ_{yy}) are due to Poisson's effect only. If we assume a depth of 300 m, an average density (unit weight) of the overburden is 0.029 MN/m^3 , and a Poisson's ratio ν of 0.25, then

$$\begin{aligned}\sigma_{zz} &= -0.029 * Z \\ &= -0.029 * (-300) \\ &= 8.7 \text{ MPa}\end{aligned}$$

Card	No of		
<u>Group</u>	<u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>

$$\begin{aligned}
 \sigma_{xx} &= \sigma_{yy} = \nu/(1-\nu) * \sigma_{zz} \\
 &= 0.25/(1-0.25) * (-0.029) * Z \\
 &= - 0.00967 * Z \\
 &= - 0.00967 * (-300) \\
 &= 2.9 \text{ MPa}
 \end{aligned}$$

The negative sign is added because Z is directed upward in the global coordinate system. Therefore, we have:

$$\begin{aligned}
 AXX &= 0.0 \\
 BXX &= -0.00967 \\
 AYY &= 0.0 \\
 BYY &= -0.00967 \\
 AZZ &= 0.0 \\
 BZZ &= -0.029 \\
 AXY &= BXY = 0.0 \\
 AXZ &= BXZ = 0.0 \\
 AYZ &= BYZ = 0.0
 \end{aligned}$$

5.0 Solution convergence control data

5.1 1 IACC, MAXINT (2I5)

IACC - MINTAB program uses an iterative equation solver. This iterative process is controlled by two parameters IACC and MAXINT. IACC specifies the convergence criterion. When the unbalanced stress is less than $0.01 * IACC * \sigma_{zz}$ the solution is considered to have converged.

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
		IACC = 1, seems to yield reasonable results.	
		MAXINT - maximum number of iterations (10 to 20 should be sufficient for most problems).	
6.0		Material properties.	
6.1		E, PR	(2E15.6)
		E - modulus of deformation of the rock mass in MPa.	
		PR - Poisson's ratio.	
6.2		STIFFC, STIFFR, STIFBC, STIFBR	(4E15.6)
		STIFFC - normal stiffness of pillars or intact elements in MPa, default = E.	
		STIFFR - shear stiffness of pillars or intact elements in MPa, default = $E/2(1 + PR)$.	
		STIFBC - normal stiffness of backfill in MPa.	
		STIFBR - shear stiffness of backfill in MPa.	
7.0		Restart file information: the following card is <u>inserted only</u> if current job is a restart job, i.e., ISTART $\neq$ 0.	

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
7.1		FILDES	(20A4)
		FILDES - the 80 character card allows the user to define the restart file. The information will be saved on the current SAVE file.	
8.0		Mining step information: for each mining step ISTPI to ISTPF the following block of information is required.	
8.1	1	ISTP	(I5)
		ISTP - is the current mining step number.	
8.2	1	STPDES	(20A4)
		STPDES - 80 character description of current mining step.	
8.3	1	MINPR	(I5)
		MINPR - mining pattern print indicator. = 0, signifies that new mining pattern is not to be printed; #0, signifies that new mining pattern is to be printed.	
9.0		Mining Pattern Information: group of cards defining a new mining pattern for the current mining step; this group is made up of sub-blocks as follows:	

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
-----------------------------	------------------------------	----------------------------	---------------

9.1.1	1	LYI, LYF	(2I5)
-------	---	----------	-------

Where LYI-LYF inclusive define a sequence of large squares in the y-direction which are to be redefined. Each large square in the sequence has 5 cards associated with it corresponding to 5 rows of small squares, i.e., the above card is followed by $5*(LYF - LYI + 1)$ cards.

Cards are all with the following format:

9.1.2	5(LYF-LYI+1)	PAT (80)	(80A1)
-------	--------------	----------	--------

PAT () - is the mining pattern which defines a maximum of 80 small squares or elements in a row of the mine grid.

The mining pattern is designated as follows:

- a 'blank' value signifies no change from the previous pattern.
- an 'E' signifies that an excavation of this element is to be implemented. If element is already excavated or mined-out, the 'E' value is treated as a blank.
- a 'B' signifies that this element is backfilled in current mining step. If element is already backfilled it will be ignored.

<u>Card</u>	<u>No of</u>	<u>Data and Definition</u>	<u>Format</u>
<u>Group</u>	<u>Cards</u>		

Note: 1) The mining pattern can be defined or modified by one or more sub-blocks (card group 9.1.1 and 9.1.2) as required.

2) The LYI of the current sub-block must be larger than the LYF of the previous sub-block.

3) A blank card must be the last card in the block of cards defining the new mining pattern.

9.1.3 1

IPRPC, ISELPR, IPRPP

(3I5)

This information controls the printing of in-reef results:

IPRPC = 0, no in-reef results are printed.
 < 0, all in-reef results are printed.
 > 0, a selected print of in-reef results.

ISELPR - this has meaning only if IPRPC > 0.
 ≠ 0, it takes the print pattern as defined in the previous mining step. If this is a restart job and ISTP= ISTPI, the print pattern will be the same as that of the restart mining step (ISTPST). If this is an initial run and ISTP = ISTPI then previous mining step print pattern is taken to be no print for in-reef results.

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
		= 0, it takes the print pattern as defined in previous step and modifying it. All remarks for the case of ISELPR $\neq$ 0 apply here as well. IPRPP - print pattern output control. = 0, mining step print pattern is not printed. $\neq$ 0, mining step print pattern is printed.	
9.2		Block of cards re-defining the print pattern. This block of cards is <u>inserted only</u> if ISELPR $\neq$ 0.	
9.2.1	1	LYI, LYF	(2I5)
		LYI-LYF inclusive define a sequence of large squares in the y-direction and this is followed by (LYF - LYI + 1) cards which define the print pattern.	
9.2.2	(LYF-LYI+1)	PAT (16)	(16A1)
		PAT () - this takes a large square as a basic unit for printing in-reef results. The print pattern is designated as follows: - a 'blank' signifies no change from previous print pattern. - 'P' signifies print.	

<u>Card</u>	<u>No of</u>		
<u>Group</u>	<u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>

- a 'N' signifies no print.

- Note: 1) A blank card must follow the block of cards re-defining the print pattern.
- 2) This ends the input for current mining step.
- 3) Repeat card groups 8 and 9 for more mining steps if required.

CONTENTS OF SAVE FILE - 'SAVE'

The following information are stored on file 'SAVE' (either on disk or on magnetic tape) after executing the MINTAB program. This information will be required either for a restart run or for off-seam stress/displacement calculations and for plotting purpose. The contents are:

MINAME	(20A4)
JOBDES	(20A4)
DATE	(20A4)
ISTART, ISTPST, ISTPI, ISTPF	(4I5)

If (ISTART .NE. 0) the following four records will be written:

FILDES (on restart file)	(20A4)
JOBDES (on restart file)	(20A4)
DATE (on restart file)	(20A4)
STPDES (on restart file)	(20A4)
NLSX, NLSY, EW, DEPTH, ALF, HO	(2I5, 4E15.7)
AXX, BXX, AYY, BYY, AZZ, BZZ	(6E15.7)
AXY, BXY, AYZ, BYZ, AXZ, BXZ	(6E15.7)
IACC, MAXINT	(2I5)
E, PR, STIFFC, STIFFR, STIFFBC, STIFFBR	(6E15.7)

For each mining step the following records are stored

ISTP	(I5)
STPDES	(20A4)
MINES (NUMLS, 5,5)	

Each large block is stored in 2 records; the first record is formatted as (16I5) and the second record is (9I5).

There are NUMLS large blocks where $\text{NUMLS} = \text{NLSX} * \text{NLSY}$.

IPRLS (NLSY, NLSX)

NLSY records - each record is a row (16I5).

NXTLOC

(I5)

DXYZO (3, NXTLOC -1)

(NXTLOC - 1) records - each record is (3E15.7)

MIN, DX, DY, DZ, SIGZZ, SIGXX, SIGYY, SIGXY, SIGYZ, SIGXZ, ENGRRL

The above are the in-reef results and are stored in 25 * NLSX * NLSY blocks with two records for each block. The format is (A1, 3E15.7/7E15.7).

OFF-REEF STRESS/DISPLACEMENT CALCULATIONS

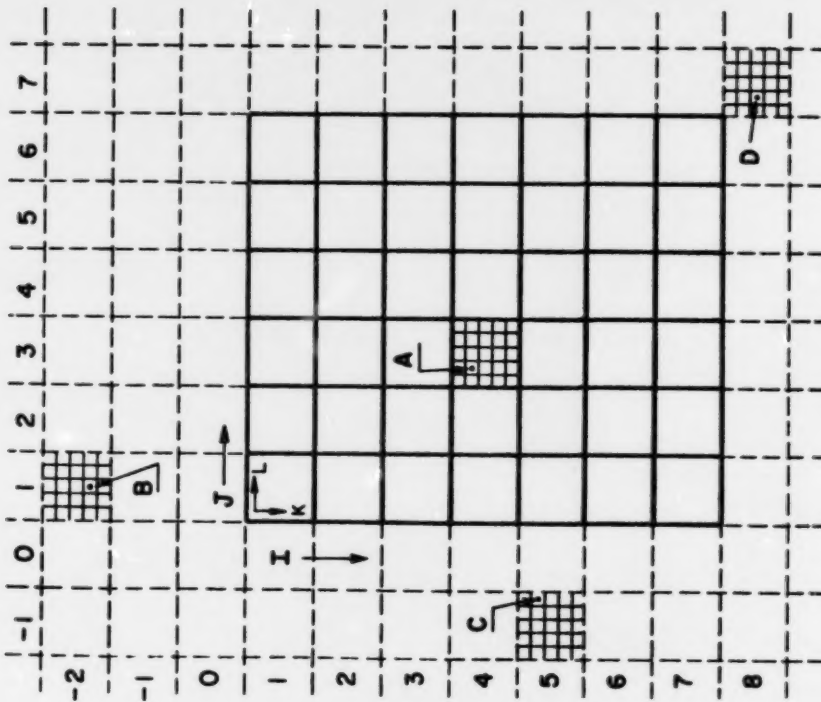
In the earlier versions of MINTAB off-reef stresses/displacements were evaluated together with the in-reef quantities (rides/closure and stresses, etc.). If additional information is required for off-reef locations other than those already specified, the MINTAB program had to be rerun, which is expensive in terms of computing time. Therefore, it is desirable to separate off-reef stress/displacement calculations from the main program and it can be run as a 'post-processor'. This routine has been re-written in Fortran ASCII 77 standard and named as OFREEF. The input data for OFREEF is quite simple. The input instructions for OFREEF and co-ordinate calculations of off-reef points are given in the following sections.

Coordinates of the Off-Seam Stress Points

Stresses and displacements for points which are located anywhere within the rock mass including points located in the mid plane of the seam can be calculated; the global or surface coordinates (X_s , Y_s , Z_s) of these points or locations have to be specified by the users. Note that the specified point is mapped onto a plane parallel to the mid-plane of seam; imagine that a mine grid is projected onto that plane and then the co-ordinates X_s and Y_s are transferred to the centroid of the nearest small element while Z_s remains unchanged. Figure 4 shows a typical projection of off-reef points.

If points or locations in relation to the reef coordinate system are desired for stress calculations, it is necessary to know the coordinates in the local (seam) system and then transform them into the global system.

For example, suppose we have a seam dipping at 15° , and the mine grid is composed of 25 x 60 small squares. The depth of seam (measured from the



NLSX = 6
NLSY = 7

Fig. 4 - Example of specified off-seam stress/displacement locations: these points are projected onto a plane parallel to the seam plane; the coordinate (X_s, Y_s) are transferred to the nearest centroid of a small element or square while Z_s remains unchanged.

Specified point	I	J	K	L
A	4	3	2	2
B	-2	1	4	3
C	5	-1	2	5
D	8	7	3	2

I, J define large squares
K, L define small squares

first row of small squares) is assumed to be 350 m and we assume the size of small square is $W = 3$ m. Now we wish to know the stresses and displacements at a point A, located at a distance of 10 m above the square (perpendicular to the seam and into the hanging well), say $I = 6$, $J = 5$, $K = 2$, $L = 4$, where I , J identifies the large squares and K , L identifies the small squares. Let's imagine that the mine grid can be mapped onto a plane passing through the point A and parallel to the seam plane, then the coordinates of A in the local (seam) coordinate system (Fig. 5) can be calculated as follows:

$$X_r = [5(J-1) + L - 1] W = [5 \times (5-1) + 4 - 1] \times 3 = 69.0 \text{ m}$$

$$Y_r = - [5(I-1) + K - 1] W = [5 \times 6(6-1) + 2 - 1] \times 3 = -78.0 \text{ m}$$

$$Z_r = 10.0 \text{ m}$$

The transformation matrix relating the local (seam) coordinates and the global (surface) coordinates is given as:

$$\begin{Bmatrix} X_s \\ Y_s \\ Z_s \end{Bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos \alpha & -\sin \alpha \\ 0 & \sin \alpha & \cos \alpha \end{bmatrix} \begin{Bmatrix} X_r \\ Y_r \\ Z_r \end{Bmatrix} + \begin{Bmatrix} 0 \\ 0 \\ -D \end{Bmatrix}$$

where α = dip angle of the seam plane in degrees (see Note)

D = depth (in metres) measured from the surface to the first row of the mine grid (small squares).

Now the global coordinates of point A is thus calculated as:

$$X_s = X_r = 69.0 \text{ m}$$

$$\begin{aligned} Y_s &= Y_r \cos \alpha - Z_r \sin \alpha \\ &= -78.0 \cos 15^\circ - 10.0 \sin 15^\circ \\ &= -77.93 \text{ m} \end{aligned}$$

$$\begin{aligned} Z_s &= Y_r \sin \alpha + Z_r \cos \alpha - D \\ &= -78.0 \sin 15^\circ + 10.0 \cos 15^\circ - 350.0 \\ &= -360.53 \text{ m.} \end{aligned}$$

Note: if the seam is dipping away from the user's eye [Fig. 1(b)], the dip angle is taken as $(180 - \alpha)$ which is greater than 90° .

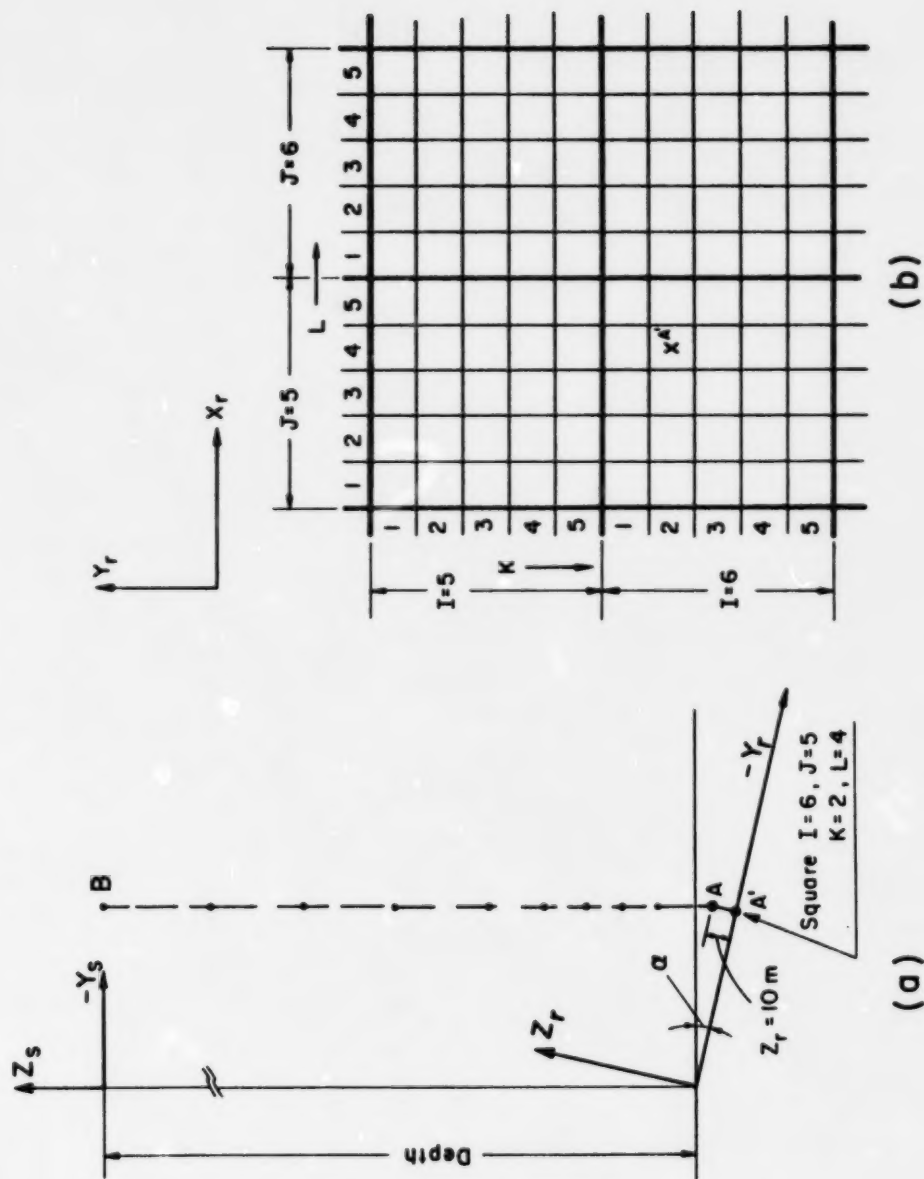


Fig. 5 - Section and plan view showing selected off-seam stress points

(a) $Y-Z_r$ plane, and (b) X_r-Y_r plane

If stresses along the vertical section AB as shown in Fig. 5 are required, the global coordinates for points along that section can be easily obtained after the coordinates of A is given. It can be seen that the values of X_s and Y_s remain constant in the global system while Z_s decreases (absolute value) and reaches 0 at the surface.

Data Input Instruction for OFREEF

The MINTAB output (SAVE file) is stored either on a disk file or on a magnetic tape when MINTAB is executed. This SAVE file has to be attached to run OFREEF. The data required for running OFREEF is quite simple and is described below:

<u>Card</u> <u>Group</u>	<u>No of</u> <u>Cards</u>	<u>Data and Definition</u>	<u>Format</u>
1.0		Control parameters	
1.1	1	NUMSTP, MAXOR	(2I5)
		NUMSTP - total number of mining steps MAXOR - maximum number of off-reef stress points to be specified for any mining step.	
2.0		Co-ordinates of off-reef or seam stress points	
2.1	1	ISTP, NUMOR	(2I5)
		ISTP - current mining step number NUMOR - number of off-reef stress points to be evaluated for this current mining step.	
2.2	NUMOR	XOR, YOR, ZOR	(3E15.7)
		XOR - X - coordinate in global system YOR - Y - coordinate in global system ZOR - Z - coordinate in global system.	

Repeat card group 2 NUMSTP times.

NOTE: If NUMOR is specified as zero (0) for the successive mining steps the off-seam stress/displacement will be calculated at the same locations as specified in the previous mining step.

EXAMPLE PROBLEM

Only a very simple problem will be considered. This example is a hypothetical stope-and-pillar extraction with backfill, and it is used for demonstration purpose only. The sequence of mining for this example is shown in Fig. 6. Four mining steps (stages) were designed; the first three steps were executed in the initial run and the fourth was done by using the restart option. The input information for the first three mining steps is shown in Fig. 7(a), Fig. 7(b) and Fig. 7(c). In addition, off-seam stress/displacements were evaluated afterward.

Suppose that a 2 m thick seam dipping at an angle of 15° to the horizontal has been extracted over a fairly large area. As extraction proceeds down dip, a rib pillar of 9 m wide was initially left standing between the two 15 m wide stopes; the first stope was backfilled prior to the extraction of the second stope. The upper portion of the second stope was backfilled before the pillar was extracted.

The example problem is modelled by using a 20×60 grid of small squares or elements to simulate the mining patterns. The deformation modulus $E = 7.0 \times 10^4$ MPa and Poisson's ratio $\nu = 0.25$ were assumed for rock mass and the orebody (seam).

The initial stress field is assumed as follows:

$$\begin{aligned}\sigma_{zz} &= -\gamma Z = -0.0270 Z \\ \sigma_{xx} &= 1.0 \sigma_{zz} = -0.0270 Z \\ \sigma_{yy} &= 1.5 \sigma_{zz} = -0.0405 Z \\ \tau_{xy} &= \tau_{yz} = \tau_{xz} = 0\end{aligned}$$

where γ is the unit weight of the rock mass and is taken as 0.027 MN/m^3 . Z is depth below the ground surface; in the global (surface) coordinate Z is directed upward. A negative sign is added to the term γZ so that the compression positive convention is maintained. Note that the unit weight of γ is not required for input but is used only for calculating initial stresses. Values of 3.5×10^2 MPa and 0.0 were assumed, respectively for the normal stiffness and shear stiffness of the backfill material.

Figure 8 shows the complete input data for the initial run of the test example. The input to the restart run is shown in Fig. 9. An example of input for off-seam stress/displacement calculations is shown in Fig. 10.

The control cards required to run MINTAB and OFREEF on the Departmental CYBER 730 are shown in Fig. 11 and 12 respectively. A partial output from this example is given in Appendix A.

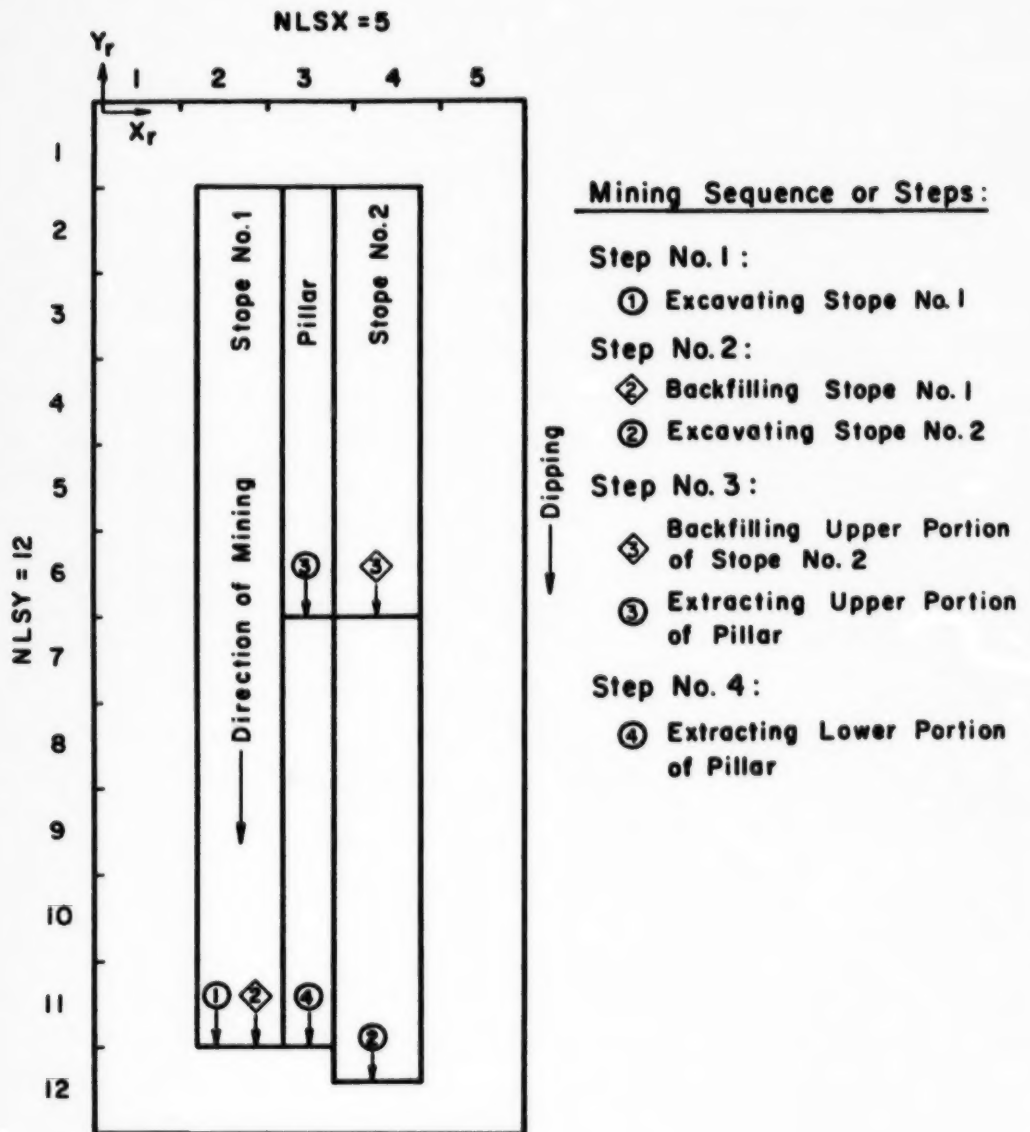


Fig. 6 - Diagram showing the sequence of mining for the sample problem

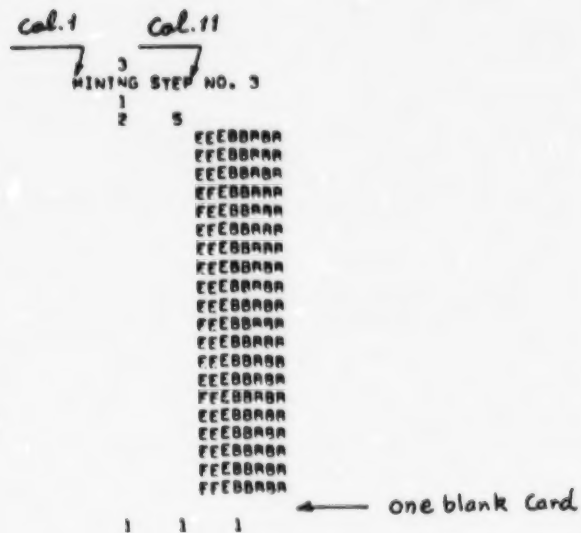


Fig. 7(c) - Mining step information (step No. 3)

Cal. 1 *Cal. 11* *Cal. 21* *Cal. 31* *Cal. 41* *Cal. 51* *Cal. 61*
 EXAMPLE PROBLEM - A HYPOTHETICAL PILLAR-AND-STOPE MINING WITH BACKFILLING
 FOR DEMONSTRATION PURPOSE ONLY
 DECEMBER 1, 1982

0	1	1	3			
5	10		3.0	350.0	15.0	2.0
		0.0		-0.02700		
		0.0		-0.04050		
		0.0		-0.02700		
		0.0		0.0		
		0.0		0.0		
		0.0		0.0		
1	20					
		7.0E04		0.25		
		7.0E04	2.77777E04		14.0E02	0.0

Mining step information - step No. 1 }	Fig. 7(a)
Mining step information - step No. 2 }	Fig. 7(b)
Mining step information - step No. 3 }	Fig. 7(c)

Fig. 8 - Complete input for the example problem (initial run)

1 1 1

3	7		
1	6		
	69.00	-77.93	-370.1879
	69.00	-77.93	-360.5200
	69.00	-77.93	-300.0000
	69.00	-77.93	-200.0000
	69.00	-77.93	-100.0000
	69.00	-77.93	0.0000
2	0		
3	7		
	69.00	-77.93	370.1879
	69.00	-77.93	360.5200
	69.00	-77.93	300.0000
	69.00	-77.93	200.0000
	69.00	-77.93	100.0000
	69.00	-77.93	0.0000
	-18.00	57.9555	365.5291

Fig. 10 - Example input required for off-seam stress/displacement calculation

```

M1234,CM100000,T300,IO400,NT1,P2.
ACCOUNT,*****.
ATTACH(O,DPL,MINTAR477,IO=MINTAB,MR=1)
ATTACH(LIB,MINTARV477LIB,IO=MINTAB,MR=1)
LIBRARY(LIB)
LABEL,SAVE,W,MINTARSAVE,IO=PE,T=10.
UPDATE(C=MINTABS)
FTNS(I=MINTABS,B=MINTAR,L=0)
LDSFT(PRESET=INDEF)
MINTAB.
7/8/9      MULTIPLE PUNCH IN COLUMN 1
*C MINTAB
*IDENT MOD
*D MINTAB.28,29
      COMMON A(7000)
      MXDIM=7000
7/8/9      MULTIPLE PUNCH IN COLUMN 1

```

input data } (Fig. 8)

```

7/8/9      MULTIPLE PUNCH IN COLUMN 1
6/7/8/9    MULTIPLE PUNCH IN COLUMN 1

```

Fig. 11 - Control cards required to execute MINTAR

```

H1234,CH75000,T200,I0200,NT1,P2.
ACCOUNT,*****.
ATTACH(OI DPL,OFREEF4,ID=MINTAB,MR=1)
ATTACH(OFLIB,OFREEF4LIB,ID=MINTAR,MR=1)
LABEL,MINFIL,R,L=MINTARSAVE,D=PE,VSN=*****.
LIBRARY(OFLIB)
UPDATE(C=OFREEFS)
FTNS(I=OFREEFS,B=OFREEF,L=0)
LDSET(PRESET=INDEF)
OFREEF.
7/8/9      MULTIPLE PUNCH IN CIOUMN 1
*C OFREEF
*IDENT MOD
*D OFREEF,30,31
COMMON A(3000)
MXDIM=3000
7/8/9      MULTIPLE PUNCH IN CIOUMN 1

```

input data } (Fig. 10)

```

7/8/9      MULTIPLE PUNCH IN CIOUMN 1
6/7/8/9    MULTIPLE PUNCH IN CIOUMN 1

```

Fig. 12 - Control cards required to execute OFREEF

ACKNOWLEDGEMENTS

The authors wish to thank Consolidated Goldfields Corporation in South Africa, Rio Algom Ltd., and Denison Mines Ltd., Elliot Lake, Ontario for their efforts and generosity in making the earlier version of this computer program available to Mining Research Laboratories.

REFERENCES

1. Salamon, M.G.D. "Elastic analysis of displacements and stresses by mining of seam or reef deposits"; Journal of the South African Institute of Mining and Metallurgy, part 1; vol 64; pp 128-149; Nov. 1963; part 2; vol 64; pp 147-218; Jan. 1964; part 3; vol 64; pp 468-500; May 1964 part 4; vol 65; pp 319-341; Dec. 1964.
2. Starfield, A.M. and Crouch, S.L. "Elastic analysis of single seam extraction"; New horizons in rock mechanics; edited by Hardy, H.R. Jr. and Stefanko, R.; ASCE, New York, 1973.
3. Moris, J.P.E. "SHAMIP - A computer program for elastic analysis of large size, tabular, mono-planar, shallow, hard orebodies"; Research Report No. 51/75; Mining Operations Laboratory, Chamber of Mines of South Africa; Sept. 1975.
4. Yu, Y.S., Toews, N.A. and Wong, A.S. "MINTAB User's Guide - A mining simulator for determining the elastic reponse of strata surrounding tabular mining excavations (Version 2.0, 1981)"; Division Report MRP/MRL 81-131(TR), Mining Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa, 1981.



APPENDIX

PARTIAL OUTPUT FROM EXAMPLE PROBLEM

 MINE : EXAMPLE PROBLEM - A HYPOTHETICAL PILLAR-AND-SLOPE MINING WITH BACKFILLING

JOB DESCRIPTION : FOR DEMONSTRATION PURPOSE ONLY

DATE : DECEMBER 1, 1982

 INPUT PARAMETERS

RESTART INDICATOR = 0
 MINING STEP ON RESTART FILE USED = 1
 INITIAL MINING STEP IN THIS RUN = 1
 FINAL MINING STEP IN THIS RUN = 3

NUMBER OF LARGE SQUARES IN X-DIRECTION = 5
 NUMBER OF LARGE SQUARES IN Y-DIRECTION = 10
 WIDTH OF SMALL GRID ELEMENT IN METERS = .300000E+01
 DEPTH OF THE FIRST ROW OF THE MINE GRID IN METERS = .350000E+03
 DIP ANGLE OF THE SEAM PLANE IN DEGREES = .150000E+02
 STOPPING THICKNESS IN METERS = .200000E+01

INSITU STRESSES IN GLOBAL CO-ORDINATES
 SAX = AX1 + BAX*Z AX1 = 0. BAX = -.2700000E-01
 SY1 = AYY + BYY*Z AYY = 0. BYY = -.650000E-01
 SZ1 = AZ1 + BZZ*Z AZ1 = 0. BZZ = -.2700000E-01
 SXY = AXY + BXY*Z AXY = 0. BXY = 0.
 SZX = AXZ + BZX*Z AXZ = 0. BZX = 0.
 SYZ = AYZ + BYZ*Z AYZ = 0. BYZ = 0.
 SOLVER CONVERGENCE CONTROL
 PERCENT OF PRIMITIVE STRESS FOR CONVERGENCE CRITERION = 1
 MAXIMUM NUMBER OF ITERATIONS = 20

DEFORMATION MODULUS OF ROCK IN MPA = .700000E+05
 POISSON'S RATIO OF ROCK = .250000E+00
 PILLAR NORMAL STIFFNESS IN MPA = .700000E+05
 PILLAR SHEAR STIFFNESS IN MPA = .277777E+05
 BACKFILL NORMAL STIFFNESS IN MPA = .140000E+04
 BACKFILL SHEAR STIFFNESS IN MPA = 0.

..... MINING STEP NUMBER 1

STEP DESCRIPTION
MINING STEP NO. 1

MINING PATTERN
MINING PATTERN IS PRINTED = 200
THE NUMBER OF ADDITIONAL ELEMENTS EXCAVATED = 0
THE NUMBER OF ADDITIONAL BACKFILL ELEMENTS CREATED = 0
THE NUMBER OF BACKFILL ELEMENTS EXCAVATED = 0

PRINT PATTERN FOR IN-REEF RESULTS
 DO A SELECTIVE PRINT OF REEF RESULTS BY MODIFYING THE PRINT PATTERN OF PREVIOUS MINING STEP
 OUTPUT PRINT PATTERN

PRINT PATTERN FOR MINING STEP 1

1	2	3	4	5
1	N	N	N	N
2	N	N	N	N
3	N	N	N	N
4	N	N	P	N
5	N	N	P	N
6	P	P	P	P
7	N	N	P	N
8	N	N	N	N
9	N	N	N	N
10	N	N	N	N

SOLVING FOR CLOSURES AND RIDES FOR MINING STEP 1

ITERATION PROCESS FOR CLOSURES CONVERGED AFTER 9 ITERATIONS.

CP TIME= 32.785

ITERATION PROCESS FOR RIDES CONVERGED AFTER 5 ITERATIONS.

CP TIME= 47.907

RESULT IS FOR REEF PLANE (NOTE: I-J LOCATES LARGE SQUARE AND K-L LOCATES SMALL SQUARE.)

K	L	CODE	DA	DY	OZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGX	SIGY	ENERGY	REFL.
I = 4 J = 3													
1	1	E	-17028E-05	-5357AF-03	32519E-02	-19058E-02	-61722E-02	50452F-02	12700E+00	-10182E+00	96542E+01	0.	0.
1	2	E	-1701E-05	-81259F-04	29872E-03	-94430E-02	-23353E+01	20547F+02	14444E+00	20367E+02	19300E+02	0.	0.
1	3	E	-70732E-06	-3235AF-04	10738E-03	-10147E-01	-16670E+01	13449F+02	12706E+00	13638E+02	16083E+02	0.	0.
1	4	E	-55494E-06	-17624F-04	57247E-04	-89376E-02	-14450E+01	12095E+02	11697E+00	11835E+02	15254E+02	0.	0.
1	5	E	-46827E-06	-11131E-04	35991E-04	-77355E-02	-13756E+01	11351E+02	11097E+00	11050E+02	14246E+02	0.	0.
2	1	E	-13116E-05	-54021F-03	32721E-02	-17509E-02	-60926E-02	-26107F-02	86556E+01	-13709E+00	90995E+01	0.	0.
2	2	E	-91206E-06	-02256F-04	30154E-03	-64022E-02	-23516E+01	20659E+02	92576E+01	20477E+02	19477E+02	0.	0.
2	3	E	-51444E-06	-32917F-04	10844E-03	-75203E-02	-16774E+01	13920E+02	81108E+01	13694E+02	14151E+02	0.	0.
2	4	E	-39176E-06	-18004F-04	58219E-04	-65253E-02	-14728E+01	12150E+02	73059E+01	11883E+02	15308E+02	0.	0.
2	5	E	-31997E-06	-11374F-04	36670E-04	-57168E-02	-13819E+01	11397E+02	85422E+01	11093E+02	14968E+02	0.	0.
3	1	E	-80311E-06	-54303F-03	32849E-02	-14271E-02	-68153E-02	18199F+02	51455E+01	-14648E+00	91345E+01	0.	0.
3	2	E	-67025E-06	-02814F-04	30288E-03	-29837E-02	-23624E+01	20736E+02	50472E+01	20546E+02	19544E+02	0.	0.
3	3	E	-30591E-06	-13197F-04	10946E-03	-65781E-02	-16861E+01	13966E+02	-90436E+01	13736E+02	16149E+02	0.	0.
3	4	E	-19456E-06	-18179F-04	58615E-04	-34508E-02	-14778E+01	12187E+02	25107E+01	11918E+02	15348E+02	0.	0.
3	5	E	-15248E-06	-11473E-04	36937E-04	-34649E-02	-13863E+01	11429F+02	31428E+01	11124E+02	15004E+02	0.	0.
4	1	E	-33064E-06	-54464E-03	32920E-02	-16846E-02	-59967E-02	17574E+02	18569E+01	-14258E+00	91497E+01	0.	0.
4	2	E	-44632E-06	-83505E-04	30358E-03	-12579E-03	-23676E+01	20774E+02	10436E+01	20591E+02	19575E+02	0.	0.
4	3	E	-10488E-06	-33265F-04	10962E-03	-16508E-02	-16873E+01	13990E+02	54582E+01	13764E+02	16224E+02	0.	0.
4	4	E	-14187E-07	-10204F-04	58624E-04	-11654E-02	-14806E+01	12207E+02	-29194E-02	11941E+02	15374E+02	0.	0.
4	5	E	-37733E-08	-11494F-04	36910E-04	-11627E-02	-13888E+01	11448E+02	-25670E-02	11144E+02	15033E+02	0.	0.
5	1	E	-33381E-07	-54519E-03	32956E-02	-17045E-02	-88409E-02	-2694E-03	-14463E-01	12550E+00	91498E+01	0.	0.
5	2	E	-28844E-06	-82976F-04	30326E-03	-25910E-02	-23699E+01	20788F+02	-31976E-01	20626E+02	19580E+02	0.	0.
5	3	E	-62244E-07	-33148F-04	13912E-03	-64945E-03	-16883E+01	13995E+02	-95046E-01	13783E+02	16233E+02	0.	0.
5	4	E	-14968E-06	-18114F-04	58191E-04	-93907E-03	-14819E+01	12714E+02	-45404E-01	11953E+02	15391E+02	0.	0.
5	5	E	-13636E-06	-11443F-04	36588E-04	-76076E-03	-13906E+01	11459E+02	-39484E-01	11155E+02	15056E+02	0.	0.
I = 5 J = 3													
1	1	E	-98045E-06	-54810F-03	33083E-02	-20777E-02	-64092E-02	50010F-02	93812E-01	-16072E+00	91911E+01	0.	0.
1	2	E	-83190E-06	-83688F-04	30503E-03	-52858E-02	-23817E+01	20876E+02	10880E+00	20688E+02	19649E+02	0.	0.
1	3	E	-49348E-06	-33631F-04	11027E-03	-71653E-02	-16975E+01	14059E+02	10283E+00	13822E+02	16309E+02	0.	0.
1	4	E	-37554E-06	-18516F-04	59188E-04	-64689E-02	-14902E+01	12271E+02	94148E-01	11986E+02	15443E+02	0.	0.
1	5	E	-30560E-06	-11825F-04	37493E-04	-55509E-02	-13981E+01	11512E+02	82862E-01	11186E+02	15124E+02	0.	0.
2	1	E	-73437E-06	-55111F-03	33273E-02	-14184E-02	-62828E-02	-25117E-02	58524E-01	16960E+00	92279E+01	0.	0.
2	2	E	-67458E-06	-84386F-04	30726E-03	-29607E-02	-23940E+01	20867E+02	65180E-01	20759E+02	19754E+02	0.	0.
2	3	E	-32048E-06	-34040F-04	11148E-03	-49269E-02	-17059E+01	14120E+02	57945E-01	13849E+02	16373E+02	0.	0.
2	4	E	-23012E-06	-18797F-04	60004E-04	-43130E-02	-14967E+01	12321E+02	52354E-01	12029E+02	15514E+02	0.	0.
2	5	E	-17284E-06	-11992F-04	38061E-04	-37320E-02	-14035E+01	11554E+02	46429E-01	11229E+02	15514E+02	0.	0.
3	1	E	-30362E-06	-55294F-03	33335E-02	-16867E-02	-69949E-02	17943E+02	26194E-01	17474E+00	92547E+01	0.	0.
3	2	E	-45882E-06	-84745F-04	30822E-03	-64429E-04	-24020E+01	21031E+02	25371E-01	20815E+02	19814E+02	0.	0.
3	3	E	-13415E-06	-34244F-04	11194E-03	-21960E-02	-17113E+01	14161E+02	18137E-01	13906E+02	16418E+02	0.	0.
3	4	E	-60404E-07	-18913F-04	60300E-04	-17620E-02	-15010E+01	12354E+02	14408E-01	12060E+02	15522E+02	0.	0.
3	5	E	-11410E-07	-12052F-04	38270E-04	-15599E-02	-14074E+01	11584E+02	12355E-01	11254E+02	15203E+02	0.	0.
4	1	E	-13268E-06	-55383E-03	33382E-02	-17313E-02	-60224E-02	17360E+02	-58248E-02	16727E+00	92704E+01	0.	0.
4	2	E	-25007E-06	-84813F-04	30862E-03	-31339E-02	-24049E+01	21058E+02	-13924E-01	20850E+02	19838E+02	0.	0.
4	3	E	-54561E-07	-34206F-04	11196E-03	-62313E-03	-17134E+01	14180F+02	-13924E-01	13930E+02	16440E+02	0.	0.
4	4	E	-13150E-06	-18882F-04	60236E-04	-83352E-03	-15030E+01	13732E+02	-2377E-01	12081E+02	15877E+02	0.	0.
4	5	E	-14038E-06	-12033F-04	88191E-04	-69657E-03	-14095E+01	11602F+02	-21922E-01	11273E+02	15230E+02	0.	0.
5	1	E	-60764E-06	-55353F-03	33392E-03	-17072E-02	-89515E-02	41078F+03	-39703E-01	14629E+00	92645E+01	0.	0.
5	2	E	-77974E-07	-84556F-04	30795E-02	-5325E-02	-24046E+01	21061E+02	-56863E-01	20875E+02	19837E+02	0.	0.
5	3	E	-21771E-06	-33993F-04	11129E-03	-28035E-02	-17129E+01	14178E+02	-66941E-01	13944E+02	16445E+02	0.	0.
5	4	E	-29804E-06	-18724F-04	59695E-04	-28638E-02	-15034E+01	12375E+02	-66026E-01	12990E+02	15592E+02	0.	0.

RESULTS FOR REEF PLANE (NOTE: I,J LOCATES LARGE SQUARE AND K,L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGX	SIGY	ENERGY REL.
5 5	0	.26912E-06	-.11933E-04	.37789E-04	.25647E-02	-.14105E+01	.11609E-02	-.59014E-01	.11282E+02	.15252E+02 0.
I=6 J=1										
1 1	0	.16208E-06	-.59009E-05	.19053E-04	.23453E-02	-.13286E+01	.10975E-02	-.62343E-01	.10625E+02	.14976E+02 0.
1 1	0	.21214E-06	-.61825E-05	.26013E-04	.30414E-02	-.13603E+01	.11219E-02	-.52117E-01	.10894E+02	.15073E+02 0.
1 2	0	.26028E-06	-.11527E-04	.36796E-04	.34538E-02	-.14067E+01	.11596E-02	-.62741E-01	.11304E+02	.15230E+02 0.
1 4	0	.44202E-06	-.17938E-04	.57692E-04	.26861E-02	-.14942E+01	.12327E-02	-.71005E-01	.12072E+02	.15557E+02 0.
1 5	0	.20859E-06	-.32204E-04	.10840E-03	.56970E-02	-.17079E+01	.14106E-02	-.76057E-01	.13694E+02	.16403E+02 0.
2 1	0	.81250E-07	-.59545E-05	.19290E-04	.12222E-02	-.13202E+01	.11005E-02	-.19734E-01	.10657E+02	.15009E+02 0.
2 2	0	.11322E-06	.82712E-05	.26355E-04	.16455E-02	-.13642E+01	.11252E-02	-.24492E-01	.10929E+02	.15108E+02 0.
2 3	0	.15622E-06	-.11659E-04	.37272E-04	.19500E-02	-.14114E+01	.11635E-02	-.25394E-01	.11340E+02	.15270E+02 0.
2 4	0	.21915E-06	.10259E-04	.58371E-04	.14507E-02	-.14986E+01	.12372E-02	-.3743E-01	.12110E+02	.15606E+02 0.
2 5	0	.21492E-06	-.32358E-04	.10934E-03	.21502E-02	-.17176E+01	.14161E-02	-.37131E-01	.13935E+02	.16465E+02 0.
3 1	0	-.19669E-07	-.59731E-05	.19378E-04	.14615E-03	-.13349E+01	.11030E-02	.24925E-02	.10682E+02	.15040E+02 0.
3 2	0	-.15261E-07	.83034E-05	.26483E-04	.15617E-03	-.13673E+01	.11279E-02	.92459E-03	.10955E+02	.15140E+02 0.
3 3	0	-.16285E-08	-.11720E-04	.37458E-04	.41234E-04	-.14148E+01	.11663E-02	.92459E-03	.11367E+02	.15304E+02 0.
3 4	0	.52581E-07	.18378E-04	.58644E-04	.32686E-03	-.15020E+01	.12403E-02	.56477E-03	.12139E+02	.15643E+02 0.
3 5	0	.86953E-07	.32318E-04	.10975E-03	.57620E-03	-.17235E+01	.14198E-02	.31752E-02	.13967E+02	.16507E+02 0.
4 1	0	-.12134E-06	-.59493E-05	.19308E-04	.16153E-02	-.13312E+01	.11049E-02	.24450E-01	.10700E+02	.15070E+02 0.
4 2	0	-.14445E-06	-.82704E-05	.26385E-04	.19737E-02	-.13693E+01	.11279E-02	.28380E-01	.10973E+02	.15169E+02 0.
4 3	0	-.15033E-06	-.11683E-04	.37332E-04	.21373E-02	-.14165E+01	.11680E-02	.31423E-01	.11366E+02	.15331E+02 0.
4 4	0	-.93793E-07	.18337E-04	.58501E-04	.27876E-02	-.15032E+01	.12419E-02	.32455E-01	.12158E+02	.15667E+02 0.
4 5	0	-.75446E-07	-.32219E-04	.10961E-03	.30173E-02	-.17242E+01	.14215E-02	.37126E-01	.13989E+02	.16529E+02 0.
5 1	0	-.20654E-06	-.58750E-05	.19068E-04	.28077E-02	-.13388E+01	.11062E-02	.47804E-01	.10711E+02	.15090E+02 0.
5 2	0	-.25037E-06	-.81535E-05	.26050E-04	.34279E-02	-.13705E+01	.11307E-02	.56415E-01	.10982E+02	.15194E+02 0.
5 3	0	-.27432E-06	-.11509E-04	.36806E-04	.38346E-02	-.14172E+01	.11686E-02	.64401E-01	.11394E+02	.15351E+02 0.
5 4	0	-.24346E-06	-.18031E-04	.57925E-04	.43777E-02	-.15036E+01	.12421E-02	.70775E-01	.12167E+02	.15680E+02 0.
5 5	0	-.16081E-06	-.31459E-04	.10885E-03	.58174E-02	-.17288E+01	.14212E+02	.71067E-01	.14002E+02	.16532E+02 0.

I=6 J=2										
1 1	0	.20018E-06	-.05623E-04	.31007E-03	.84739E-02	-.24198E+01	.21162E+02	-.95407E-01	.20893E+02	.19988E+02 0.
1 2	0	.11270E-05	-.55815E-03	.33550E-02	-.14448E-02	-.12867E-02	.53978E-02	-.80358E-01	.23505E+00	.93659E+01 0.
1 3	0	.91572E-06	-.71862E-03	.43803E-02	-.34287E-02	.64539E-03	.31598E-02	-.43742E-01	.19831E+00	.93600E+01 0.
1 4	0	-.55753E-06	-.76388E-03	.46736E-02	.57879E-02	-.42833E-02	.38256E-03	.10731E-02	.18758E+00	.93271E+01 0.
1 5	0	-.41192E-06	-.71872E-03	.43786E-02	.19268E-02	.60371E-02	.46918E-02	.44589E-01	.20350E+00	.93354E+01 0.
2 1	0	.96605E-07	.86196E-04	.31182E-03	.60679E-02	-.24295E-03	.20004E-02	.52156E-01	.20955E+00	.20072E+02 0.
2 2	0	.84478E-06	-.50050E-03	.33674E-02	.14969E-02	.92962E-03	.21244E-02	.45704E-01	.25260E+00	.94077E+01 0.
2 3	0	.72154E-06	-.72161E-03	.43967E-02	-.34889E-02	.16587E-02	.14255E-02	.23448E-01	.22437E+00	.93804E+01 0.
2 4	0	-.50545E-06	-.76886E-03	.46906E-02	.51406E-02	-.51419E-02	.12644E-02	.81190E-03	.21268E+00	.93727E+01 0.
2 5	0	-.33234E-06	-.86443E-04	.33941E-02	-.10787E-02	.81191E-02	.29494E-02	.24415E-01	.22189E+00	.93645E+01 0.
3 1	0	-.10433E-06	-.86443E-04	.31272E-03	.30231E-02	-.24359E-01	.21302E-02	.12400E-01	.21005E+02	.20125E+02 0.
3 2	0	.39105E-06	-.56188E-03	.33762E-02	.16063E-02	-.13254E-02	-.32632E-02	.12918E-01	.25976E+00	.94322E+01 0.
3 3	0	.47790E-06	.72333E-03	.44077E-02	.39057E-02	.10998E-02	.73155E-02	.60493E-02	.23076E+00	.94070E+01 0.
3 4	0	.50424E-06	.76859E-03	.47019E-02	.52246E-02	-.65152E-02	.64318E-02	.53491E-03	.21521E+00	.94022E+01 0.
3 5	0	-.41767E-07	.72350E-03	.44057E-02	.12399E-02	.79124E-02	-.47274E-02	.75592E-02	.23402E+00	.94043E+01 0.
4 1	0	-.31635E-06	-.86381E-04	.31271E-03	.75531E-04	-.24373E-01	.21325E-02	.28041E-01	.21037E+02	.20148E+02 0.
4 2	0	-.8744E-07	.56218E-03	.33797E-02	-.13579E-02	-.55507E-03	.65402E-02	.20493E-01	.25298E+00	.94397E+01 0.
4 3	0	.17762E-06	-.72358E-03	.44120E-02	.36491E-02	.71738E-03	-.52012E-03	.11396E-01	.21057E+00	.94144E+01 0.
4 4	0	-.51765E-06	.76875E-03	.47067E-02	.54218E-02	-.62315E-02	.40646E-02	.32755E-03	.20544E+00	.94081E+01 0.
4 5	0	.22917E-06	-.72384E-03	.44098E-02	.11608E-02	.76447E-02	-.89765E-03	-.10118E-01	.22061E+00	.94158E+01 0.
5 1	0	-.49094E-06	-.86004E-04	.31186E-03	.23975E-02	-.24343E-01	.21316E-02	.73521E-01	.21052E+02	.20134E+02 0.
5 2	0	-.32383E-06	-.56140E-04	.33788E-02	.19578E-02	-.53973E-04	-.14077E-02	.56749E-01	.23348E+00	.94281E+01 0.
5 3	0	-.72322E-07	.72322E-03	.44106E-03	.44519E-02	.74039E-03	.94105E-02	.31262E-01	.16212E+00	.94105E+01 0.

RESULTS FOR REEF PLANE (NOTE: I, J LOCATES LARGE SQUARE AND K, L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGXX	SIGYY	ENERGY REL.
5 4 E	-52215E-06	-76792F-03	.47057E-02	.54374E-02	-.66909E-02	.46475F-03	.21777E-03	-.17733E+00	.93938E+01 0.	
5 5 E	.41644E+06	-.72342E-03	.44087E-02	-.12981E-02	.13855E-01	-.29225E-02	-.30441E-01	-.19246E+00	.94038E+01 0.	
I= 6 J= 3										
1 1 E	-.63822E-06	-.55499F-03	.33665E-02	-.21102E-02	-.65598E-02	.50555F-02	.76917E-01	-.14601E+00	.92925E+01 0.	
1 2 E	-.68573E-06	-.94802F-04	.30864E-03	-.31640E-02	-.24101E-01	.21111E-02	.92497E-01	.20921E+02	.19A44E+02 0.	
1 3 E	-.37A80E-06	.34102F-04	.11159E-03	-.55766E-02	-.17170E-01	.14213E-02	.89599E-01	.13975E+02	.16484E+02 0.	
1 4 E	-.27362E-06	-.18789F-04	.59900E-04	-.50831E-02	-.15070E-01	.12404E-02	.82160E-01	.12117E+02	.15620E+02 0.	
1 5 E	-.20916E-06	-.12005F-04	.37943E-04	-.26037E-02	-.14136E-01	.11636E-02	.71404E-01	.11307E+02	.15287E+02 0.	
2 1 E	-.41531E-06	.55733F-03	.33598E-02	-.14414E-02	-.64220E-02	-.25568F-02	.42770E-01	-.17228E+00	.93766E+01 0.	
2 2 E	-.53820E-06	-.85355F-04	.31062E-03	-.97492E-03	-.24203E-01	.21193F-02	.49739E-01	.20983E+02	.19965E+02 0.	
2 3 E	-.22106E-06	-.34433F-04	.11269E-03	-.33830E-02	-.17243E-01	.14271F-02	.44405E-01	.14018E+02	.16546E+02 0.	
2 4 E	-.13040E-06	.19011F-04	.60641E-04	-.29491E-02	-.15127E-01	.12451E-02	.39886E-01	.12158E+02	.15677E+02 0.	
2 5 E	-.78724E-07	-.12125F-04	.38454E-04	-.27449E-02	-.14184E-01	.11678F-02	.34582E-01	.11345E+02	.15327E+02 0.	
3 1 E	.13432E-07	-.55869F-03	.33682E-02	-.17049E-02	-.71130E-02	.18129F-02	.10573E-01	-.17532E+00	.93594E+01 0.	
3 2 E	-.32328E-06	-.85605E-04	.31139E-03	-.20280E-02	-.24268E-01	.21251F-02	.98A55E-02	.21033E+02	.20020E+02 0.	
3 3 E	-.22507E-07	-.34543F-04	.11306E-03	-.64238E-03	-.17290E-01	.14308E-02	.44A37E-02	.14052E+02	.16589E+02 0.	
3 4 E	-.54804E-07	.19094F-04	.60898E-04	-.37984E-03	-.15165E-01	.12403E-02	.17408E-02	.12188E+02	.15715E+02 0.	
3 5 E	.83357E-07	-.12159E-04	.38632E-04	-.26047E-03	-.14220E-01	.11705E-02	.14A94E-03	.11373E+02	.15361E+02 0.	
4 1 E	.46509E-06	-.55901F-03	.33714E-02	-.17407E-02	-.29707E-02	.17752F-02	.22715E-01	-.16559E+00	.93648E+01 0.	
4 2 E	-.10917E-06	.85540F-04	.31159E-03	.52017E-02	-.24281E-01	.21271F-02	.30301E-01	.21062E+02	.20041E+02 0.	
4 3 E	.16937E-06	-.34486F-04	.11300E-03	.22412E-02	-.17303E-01	.14324E-02	.35786E-01	.14073E+02	.16610E+02 0.	
4 4 E	.23497E-06	.19023F-04	.60775E-04	-.20813E-02	-.15181E-01	.12499F-02	.36A42E-01	.12206E+02	.15739E+02 0.	
4 5 E	.23794E-06	.12112E-04	.38519E-04	.20301E-02	-.14238E-01	.11721F-02	.34A89E-01	.11390E+02	.15388E+02 0.	
5 1 E	.377424E-06	-.55794F-03	.33701E-02	-.16754E-02	-.89689E-02	.50770E-03	.58266E-01	-.14126E+00	.93578E+01 0.	
5 2 E	.59130E-07	.85146E-04	.31064E-03	.75914E-02	-.24257E-01	.21263E-02	.75009E-01	.21078E+02	.20032E+02 0.	
5 3 E	.34122E-06	-.34189F-04	.11220E-03	.45260E-02	-.17287E-01	.14319E-02	.82045E-01	.14083E+02	.16612E+02 0.	
5 4 E	.39962E-06	.18805F-04	.60144E-04	.43699E-02	-.15175E-01	.12499E-02	.79736E-01	.12213E+02	.15751E+02 0.	
5 5 E	.37192E-06	-.11966F-04	.38048E-04	.39783E-02	-.14241E+01	.11724E-02	-.71982E-01	.11397E+02	.15408E+02 0.	
I= 6 J= 4										
1 1 E	-.31266E-07	-.62740F-05	.19118E-04	-.10054E-02	-.13332E+01	.10977E+02	.12079E-01	.10691E+02	.14914E+02 0.	
1 2 E	-.18023E-07	-.48890F-05	.15479E-04	-.68525E-03	-.13147E-01	.10850E+02	.96001E-02	.10556E+02	.14898E+02 0.	
1 3 E	-.14005E-07	-.42233F-05	.13647E-04	-.49839E-03	-.13055E-01	.10784F+02	.73447E-02	.10485E+02	.14433E+02 0.	
1 4 E	-.12798E-07	.38082E-05	.12503E-04	-.31305E-03	-.12998E-01	.10746F+02	.52197E-02	.10440E+02	.14818E+02 0.	
1 5 E	-.20111E-08	.34352F-05	.12011E-04	-.22308E-03	-.12944E-01	.10711E+02	.34414E-02	.10401E+02	.14805E+02 0.	
2 1 E	.52883E-08	.64332F-05	.19268E-04	-.44387E-03	-.13364E-01	.11004E+02	.39771E-02	.10716E+02	.14948E+02 0.	
2 2 E	.12285E-07	-.49335E-05	.15882E-04	-.20221E-03	-.13177E-01	.10875E+02	.27428E-02	.10580E+02	.14890E+02 0.	
2 3 E	.12798E-07	-.42486F-05	.13723E-04	-.80023E-04	-.13084E-01	.10810E+02	.15777E-02	.10509E+02	.14864E+02 0.	
2 4 E	.92284E-08	.38273F-05	.12559E-04	.67822E-04	-.13026E-01	.10769E+02	.52537E-03	.10463E+02	.14849E+02 0.	
2 5 E	.18700E-08	-.34436F-05	.11547E-04	.84621E-04	-.12973E-01	.10734E+02	-.37145E-03	.10424E+02	.14836E+02 0.	
3 1 E	.61849E-07	.63619F-05	.19323E-04	.32166E-03	-.13393E-01	.11028F+02	-.35885E-02	.10739E+02	.14980E+02 0.	
3 2 E	.53066E-07	-.49528F-05	.15619E-04	.34262E-03	-.13205E-01	.10898E+02	-.38513E-02	.10603E+02	.14922E+02 0.	
3 3 E	.59824E-07	.42593F-05	.13748E-04	.38833E-03	-.13111E-01	.10833E+02	-.40192E-02	.10531E+02	.14895E+02 0.	
3 4 E	.36459E-07	-.38341F-05	.12577E-04	.46570E-03	-.13052E-01	.10792E+02	-.41292E-02	.10485E+02	.14880E+02 0.	
3 5 E	.41444E-07	-.34432E-05	.11560E-04	.39535E-03	-.12999E-01	.10756E+02	-.42118E-02	.10445E+02	.14866E+02 0.	
4 1 E	.11984E-06	.63700F-05	.19287E-04	.10813E-02	-.13411E-01	.11048F+02	-.11214E-01	.10759E+02	.15009E+02 0.	
4 2 E	.88634E-07	-.49635F-05	.15592E-04	.10795E-02	-.13225E-01	.10918F+02	-.10489E-02	.10623E+02	.14952E+02 0.	
4 3 E	.74274E-07	-.42632E-05	.13727E-04	.94710E-03	-.13133E-01	.10853F+02	-.96458E-02	.10551E+02	.14925E+02 0.	
4 4 E	.61508E-07	.28319F-05	.12560E-04	.91674E-03	-.13076E-01	.10813E+02	-.88148E-02	.10505E+02	.14910E+02 0.	
4 5 E	.63133E-07	-.34394F-05	.11546E-04	.71839E-03	-.13024E-01	.10777F+02	-.80762E-02	.10466E+02	.14897E+02 0.	
5 1 E	.17265E-06	-.61988E-05	.19121E-04	.16663E-02	-.13441E-01	.11064E+02	-.19544E-01	.10776E+02	.15036E+02 0.	
5 2 E	.14595E-06	-.48555F-05	.15468E-04	.13512E-02	-.13250E-01	.10936E+02	-.17451E-01	.10640E+02	.14980E+02 0.	

RESULTS FOR REEF PLANE (NOTE: I-J LOCATES LARGE SQUARE AND K-L LOCATES SMALL SQUARE.)

K L CODE	OA	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGXX	SIGYY	ENERGY REL.
5 3	.12300E-06	-.41987E-05	.13632E-04	.12707E-02	-.13157E-01	.10872E-02	-.15478E-01	.10569E-02	.14954E-02	0.
5 4	.10060E-06	-.37875E-05	.12484E-04	.12358E-02	-.13099E-01	.10832E-02	-.1370E-01	.10524E-02	.14940E-02	0.
5 5	.92772E-07	-.34056E-05	.11487E-04	.10516E-02	-.13047E-01	.10797E-02	-.11975E-01	.10405E-02	.14927E-02	0.
I= 6 J= 5										
1 1	.23840E-07	-.18240F-05	.59698E-05	.20408E-03	-.12720E-01	.10517E-02	-.41012E-02	.10215E-02	.14700E-02	0.
1 2	.25016E-07	-.16369F-05	.55991E-05	.22840E-03	-.12695E-01	.10504F-02	-.40847E-02	.10202E-02	.14694E-02	0.
1 3	.22355E-07	-.15677F-05	.54745E-05	.23079E-03	-.12686E-01	.10500F-02	-.40473E-02	.10197E-02	.14692E-02	0.
1 4	.16812E-07	-.15021F-05	.53563E-05	.28820E-03	-.12677E-01	.10496F-02	-.40570E-02	.10193E-02	.14690E-02	0.
1 5	.25187E-07	-.13663F-05	.52884E-05	.14298E-03	-.12656E-01	.10484E-02	-.40490E-02	.10181E-02	.14684E-02	0.
2 1	.31024E-07	-.18331F-05	.59786E-05	.31935E-03	-.12746E-01	.10539E-02	-.42273E-02	.10236E-02	.14731E-02	0.
2 2	.3077E-07	-.16428F-05	.56058E-05	.3368E-03	-.12722E-01	.10526E-02	-.42263E-02	.10223E-02	.14725E-02	0.
2 3	.29212E-07	-.15713F-05	.54801E-05	.33092E-03	-.12712E-01	.10522E-02	-.42204E-02	.10218E-02	.14723E-02	0.
2 4	.23198E-07	-.15044F-05	.53611E-05	.38046E-03	-.12704E-01	.10518F-02	-.42171E-02	.10214E-02	.14721E-02	0.
2 5	.30719E-07	-.13691F-05	.50323E-05	.22903E-03	-.12682E-01	.10506E-02	-.42167E-02	.10202E-02	.14715E-02	0.
3 1	.37076E-07	-.18344E-05	.59801E-05	.40292E-03	-.12772E-01	.10561F-02	-.43462E-02	.10257E-02	.14762E-02	0.
3 2	.35238E-07	-.16446E-05	.56067E-05	.39298E-03	-.12748E-01	.10548E-02	-.43405E-02	.10244E-02	.14755E-02	0.
3 3	.32945E-07	-.15724E-05	.54807E-05	.38240E-03	-.12738E-01	.10543E-02	-.43433E-02	.10239E-02	.14753E-02	0.
3 4	.26475E-07	-.15054F-05	.53616E-05	.42781E-03	-.12730E-01	.10539F-02	-.43473E-02	.10235E-02	.14751E-02	0.
3 5	.3596E-07	-.13698F-05	.50328E-05	.26438E-03	-.12708E-01	.10528F-02	-.43709E-02	.10223E-02	.14746E-02	0.
4 1	.43988E-07	-.18377F-05	.59751E-05	.48893E-03	-.12797E-01	.10582E-02	-.44966E-02	.10278E-02	.14792E-02	0.
4 2	.38533E-07	-.16478E-05	.56029E-05	.47515E-03	-.12773E-01	.10569E-02	-.44994E-02	.10264E-02	.14786E-02	0.
4 3	.35906E-07	-.15727F-05	.54772E-05	.44981E-03	-.12764E-01	.10565E-02	-.45084E-02	.10260E-02	.14784E-02	0.
4 4	.29544E-07	-.15041E-05	.53585E-05	.48202E-03	-.12756E-01	.10561F-02	-.45223E-02	.10256E-02	.14782E-02	0.
4 5	.36546E-07	-.13683E-05	.50304E-05	.30335E-03	-.12734E-01	.10549E-02	-.45175E-02	.10244E-02	.14776E-02	0.
5 1	.59600E-07	-.17985E-05	.59505E-05	.61696E-03	-.12824E-01	.10603E-02	-.46727E-02	.10298E-02	.14822E-02	0.
5 2	.5001E-07	-.16242E-05	.55831E-05	.56789E-03	-.12799E-01	.10590F-02	-.46487E-02	.10285E-02	.14816E-02	0.
5 3	.45687E-07	-.15579E-05	.54599E-05	.48893E-03	-.12789E-01	.10584E-02	-.46432E-02	.10281E-02	.14814E-02	0.
5 4	.37687E-07	-.14932F-05	.53431E-05	.58101E-03	-.12781E-01	.10582E-02	-.46917E-02	.10276E-02	.14812E-02	0.
5 5	.42176E-07	-.13605F-05	.50182E-05	.39172E-03	-.12759E-01	.10578F-02	-.47424E-02	.10265E-02	.14807E-02	0.

I= 7 J= 3										
1 1 E	.18237E-06	-.55791E-03	.33717E-02	-.21288E-02	-.67153E-02	.52378F-02	.51421E-01	-.12507E-00	.93879E-01	0.
1 2 E	.48824E-06	-.84904E-04	.31020E-03	.36223E-03	-.24245E-01	.21273E-02	.67749E-01	.21106E-02	.20039E-02	0.
1 3 E	.22006E-06	-.33909E-04	.11161E-03	.33728E-02	-.17274E-01	.14322E-02	.67887E-01	.14106E-02	.16613E-02	0.
1 4 E	.13080E-06	-.18518F-04	.59520E-04	.31197E-02	-.15163E-01	.12499F-02	.61918E-01	.12233E-02	.15751E-02	0.
1 5 E	.74936E-07	-.11714F-04	.37416E-04	.23859E-02	-.14226E-01	.11726F-02	.51915E-01	.11417E-02	.15407E-02	0.
2 1 E	.67950E-07	-.55938F-03	.33824E-02	-.14669E-02	-.66002E-02	-.26009F-02	.17183E-01	-.14781E-00	.93981E-01	0.
2 2 E	.32725E-06	-.85269E-04	.31184E-03	.20096E-02	-.24321E-01	.21344E-02	.24187E-01	.21158E-02	.20113E-02	0.
2 3 E	.49766E-07	-.34138E-04	.11255E-03	.10023E-02	-.17333E-01	.14374E-02	.21484E-01	.14145E-02	.16671E-02	0.
2 4 E	.23072E-07	-.18649F-04	.60161E-04	.86031E-03	-.15209E-01	.12543F-02	.18759E-01	.12271E-02	.15977E-02	0.
2 5 E	.63048E-07	-.11778F-04	.37852E-04	.48741E-03	-.14267E-01	.11763E-02	.14478E-01	.11453E-02	.15446E-02	0.
3 1 E	.54662E-06	-.55991E-03	.33883E-02	-.17157E-02	-.72198E-02	.17567F-02	.16641E-01	-.14728E-00	.94233E-01	0.
3 2 E	.91760E-07	-.85341F-04	.31229E-03	.52914E-02	-.24361E-01	.21391F-02	.17129E-01	.21198E-02	.20161E-02	0.
3 3 E	.16314E-06	-.34182E-04	.11278E-03	.19401E-02	-.17367E-01	.14408F-02	.19544E-01	.14173E-02	.16712E-02	0.
3 4 E	.21883E-06	-.18695F-04	.60335E-04	.18767E-02	-.15240E-01	.12572F-02	.20937E-01	.12298E-02	.15834E-02	0.
3 5 E	.23245E-06	-.11777E-04	.37977E-04	.18105E-02	-.14297E-01	.11790E-02	.20613E-01	.11479E-02	.15479E-02	0.
4 1 E	.10456E-05	-.55918F-03	.33863E-02	-.17172E-02	-.60030E-02	.15989F-02	.53237E-01	-.13298E-00	.94280E-01	0.
4 2 E	.15692E-06	-.80771F-04	.31208E-03	.89649E-02	-.24344E-01	.21396F-02	.160439E-01	.21214E-02	.20173E-02	0.
4 3 E	.37625E-06	-.33953F-04	.11254E-03	.51188E-02	-.17367E-01	.14417F-02	.161592E-01	.14188E-02	.16729E-02	0.
4 4 E	.41363E-06	-.18577E-04	.60112E-04	.47286E-02	-.15249E-01	.12588F-02	.59992E-01	.12313E-02	.15856E-02	0.
4 5 E	.39830E-06	-.11681F-04	.37800E-04	.42259E-02	-.24311E-01	.11804F-02	.155024E-01	.11494E-02	.15505E-02	0.
5 1 E	.15505E-05	-.55451E-03	.33817E-02	-.14175E-02	-.91827E-02	.48674F-04	-.95990E-01	-.10137E-00	.94133E-01	0.

RESULTS FOR REEF PLANE (NOTE: I-J LOCATES LARGE SQUARE AND K-L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGXK	SIGYY	ENERGY REL.
5 2 *	.38844E-06	-.84323E-04	.31046E-03	.12172E-01	-.24273E-01	.21365E-02	-.11077E-00	.21288E-02	.20191E+02	0.
5 3 *	.58356E-06	-.33535E-04	.11144E-03	.78899E-02	-.17326E-01	.14401E-02	-.10099E-00	.14189E-02	.16725E+02	0.
5 4 *	.60205E-06	-.10237E-04	.59296E-04	.71611E-02	-.15226E-01	.12577E-02	-.10992E-00	.12314E-02	.15864E+02	0.
5 5 *	.55003E-06	-.11466E-04	.37200E-04	.64508E-02	-.14302E-01	.11805E-02	-.94130E-01	.11497E-02	.15922E+02	0.

CP TIME TO CALCULATE REEF STRESSES AND PRINT RESULTS= 22.799

CP TIME FOR MINING STEP 1 = 105.095

..... MINING STEP NUMBER 2

STEP DESCRIPTION
MINING STEP NO. 2

MINING PATTERN
MINING PATTERN IS PRINTED
THE NUMBER OF ADDITIONAL ELEMENTS EXCAVATED = 210
THE NUMBER OF ADDITIONAL BACKFILL ELEMENTS CREATED = 200
THE NUMBER OF BACKFILL ELEMENTS EXCAVATED = 0

PRINT PATTERN FOR IN-REEF RESULTS
DO A SELECTIVE PRINT OF REEF RESULTS USING PRINT PATTERN FROM PREVIOUS MINING STEP
OUTPUT PRINT PATTERN

PRINT PATTERN FOR MINING STEP 2

1	2	3	4	5
1	N	N	N	N
2	N	N	N	N
3	N	N	N	N
4	N	N	P	N
5	N	N	P	N
6	P	P	P	P
7	N	N	P	N
8	N	N	N	N
9	N	N	N	N
10	N	N	N	N

SOLVING FOR CLOSURES AND WIDES FOR MINING STEP 2

ITERATION PROCESS FOR CLOSURES CONVERGED AFTER 9 ITERATIONS.

CP TIME= 33.330

ITERATION PROCESS FOR RIDES CONVERGED AFTER 5 ITERATIONS.

CP TIME= 49.324

RESULTS FOR REEF PLANE (NOTE: I, J LOCATES LARGE SQUARE AND K, L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGAZ	SIGVZ	SIGZZ	SIGKY	SIGGX	SIGYY	ENERGY REL.
I=4 J=3										
1 1 8	.3823E-06	-.59224F-03	.3537E-02	-.5172E-03	.4692E-03	.2003F+00	.2958E-01	.14059E+00	.9106E+01 0.	.20723E+02 0.
1 2 8	.60531E-07	-.10647F-03	.3801E-03	-.1929E-02	-.2697E-01	.23398F+02	.30415E-01	.23320E+02	.18092E+02 0.	.20747E+02 0.
1 3 8	-.15391E-06	.68848F-04	.22951E-03	.1310E-02	.2190E-01	.18127E+02	.3641E-02	.18046E+02	.20747E+02 0.	.20747E+02 0.
1 4 8	-.16904E-06	-.10735F-03	.38401E-03	.35335E-02	-.26917E-01	.23529F+02	.38194E-01	.23453E+02	.90036E+01 .20783E-01	.91620E+01 0.
1 5 8	.67658E-07	-.59924F-03	.35892E-02	-.25147E-02	.15857E-02	.45329F+03	.37052E-01	.56061E-01	.20857E+02 0.	.20857E+02 0.
2 1 8	.38494E-06	.60540F-03	.35639E-02	-.59392E-03	.47128E-03	.20440E+00	.23707E-01	.11061E-01	.18207E+02 0.	.18207E+02 0.
2 2 8	.84761E-07	.10808F-03	.36442E-03	-.15127E-02	-.27224E-01	.23567F+02	.22831E-02	.23460E+02	.20857E+02 0.	.20857E+02 0.
2 3 8	-.15190E-06	-.70123F-04	.32272E-03	.12959E-02	.22114E-01	.18241E+02	.28891E-02	.18151E+02	.20857E+02 0.	.20857E+02 0.
2 4 8	-.18254E-06	.10900F-03	.38829E-03	.29916E-02	-.27167E-01	.23703E+02	.28897E-01	.23597E+02	.20857E+02 0.	.20857E+02 0.
3 1 8	.77457E-07	.60545F-03	.36170E-02	-.25653E-02	.10712E-02	.34330F+02	.29550E-01	.92845E-01	.90538E+01 .21029E-01	.90538E+01 .21029E-01
3 2 8	.34534E-06	.60924F-03	.35804E-02	-.45180E-03	.11585E-03	.20646F+00	.21696E-01	.98570E-01	.91970E+01 0.	.91970E+01 0.
3 3 8	.90568E-07	.10898F-03	.38675E-03	.12625E-02	-.27379E-01	.23670E+02	.16850E-01	.23553E+02	.20937E+02 0.	.20937E+02 0.
3 4 8	-.15114E-06	.70794F-04	.23435E-03	.12644E-02	-.22236E-01	.18341F+02	-.21189E-07	.18222E+02	.18274E+02 0.	.18274E+02 0.
3 5 8	-.20851E-06	.10994F-03	.39080E-03	.27750E-02	-.27318E-01	.23806F+02	.21467E-01	.23691E+02	.21004E+02 0.	.21004E+02 0.
4 1 8	.20816E-06	.61125F-03	.35886E-02	-.54613E-03	.86422E-03	.20775E+00	.23423E-01	.10222E+00	.90907E+01 .21100E-01	.90907E+01 .21100E-01
4 2 8	.18446E-06	.60926F-03	.38744E-03	.13359E-02	-.27251E-01	.23710E+02	.14614E-01	.23609E+02	.20970E+02 0.	.20970E+02 0.
4 3 8	-.21167E-06	.11028F-03	.32462E-03	.12322E-02	-.22280E-01	.18372E+02	.14727E-02	.18264E+02	.18290E+02 0.	.18290E+02 0.
4 4 8	.10595E-06	.60931E-03	.39139E-03	.28500E-02	-.27390E-01	.23856F+02	.17733E-01	.23750E+02	.21039E+02 0.	.21039E+02 0.
4 5 8	.15120E-06	.61126F-03	.36129E-02	-.24502E-02	-.28690E-02	.15842E+00	.26473E-01	.10426E+00	.91064E+01 .21277E-01	.91064E+01 .21277E-01
5 1 8	.20841E-06	.61246F-03	.35921E-02	-.67447E-03	.30406E-03	.20795E+00	.20774E-01	.11553E+00	.92195E+01 0.	.92195E+01 0.
5 2 8	.88724E-07	.10928F-03	.38688E-03	-.15718E-02	-.27464E-01	.23710E+02	.16714E-01	.23640E+02	.20961E+02 0.	.20961E+02 0.
5 3 8	-.18799E-06	.60796F-04	.23368E-03	.12861E-02	-.22282E-01	.18363F+02	.67762E-03	.18286E+02	.18290E+02 0.	.18290E+02 0.
5 4 8	-.18779E-06	.11023F-03	.39105E-03	.29600E-02	-.27407E-01	.23857F+02	.18414E-01	.23781E+02	.21029E+02 0.	.21029E+02 0.
5 5 8	.19145E-06	.61250F-03	.36469E-02	-.18253E-02	-.15319E-02	.25748F+02	.30725E-01	.91632E+01	.9117E+01 .21320E-01	.9117E+01 .21320E-01
I=5 J=3										
1 1 8	.25621E-06	-.61678E-03	.36110E-02	-.57530E-03	.35657E-03	.21214E+00	.11244E-01	.83086E-01	.92780E+01 0.	.92780E+01 0.
1 2 8	.92126E-07	-.11058F-03	.39025E-03	-.14827E-02	-.27673E-01	.23858F+02	.15601E-01	.23720E+02	.21103E+02 0.	.21103E+02 0.
1 3 8	-.15339E-06	.71909F-04	.23651E-03	.14054E-02	-.22463E-01	.18480E+02	-.3147E-02	.18349E+02	.18415E+02 0.	.18415E+02 0.
1 4 8	-.19968E-06	.61633F-03	.39438E-03	.32988E-02	-.27617E-01	.24000F+02	-.22103E-01	.23871E+02	.21172E+02 0.	.21172E+02 0.
1 5 8	.23072E-06	.61633F-03	.36664E-02	-.25567E-02	.16652E-02	.88780F+04	.17425E-01	.12649E+00	.91695E+01 .21536E-01	.91695E+01 .21536E-01
2 1 8	.21753E-06	.62083F-03	.36301E-02	-.63746E-03	.35218E-03	.21444E+00	.12154E-01	.61706E-01	.93223E+01 0.	.93223E+01 0.
2 2 8	.92042E-07	.11170E-03	.39347E-03	.13804E-02	-.27858E-01	.23922E+02	.13373E-01	.23833E+02	.21718E+02 0.	.21718E+02 0.
2 3 8	-.14969E-06	.72826F-04	.23905E-03	.13834E-02	-.22621E-01	.18591F+02	-.24357E-02	.18431E+02	.18918E+02 0.	.18918E+02 0.
2 4 8	-.18713E-06	.11246F-03	.39761E-02	.31252E-02	-.27799E-01	.24137E+02	.18306E-01	.23797E+02	.21289E+02 0.	.21289E+02 0.
2 5 8	.28959E-06	.62095F-03	.36865E-02	-.24185E-02	.10825E-02	.38747E+02	.16975E-01	.15294E+00	.92092E+01 .21732E-01	.92092E+01 .21732E-01
3 1 8	.14849E-06	.62326F-03	.36422E-02	-.46611E-03	.90102E-04	.21616F+00	.13715E-01	.54425E-01	.93511E+01 0.	.93511E+01 0.
3 2 8	.94696E-07	.73258F-04	.39516E-03	.13056E-02	-.27794E-01	.24073E+02	.10929E-01	.23905E+02	.21286E+02 0.	.21286E+02 0.
3 3 8	-.14711E-06	.73258F-04	.24024E-03	.13624E-02	-.27710E-01	.18655F+02	.17915E-02	.18486E+02	.18578E+02 0.	.18578E+02 0.
3 4 8	-.18840E-06	.11326F-03	.39944E-03	.31106E-02	-.27904E-01	.24217F+02	.14151E-01	.24051E+02	.21356E+02 0.	.21356E+02 0.
3 5 8	.29471E-06	.62335F-03	.36988E-02	-.21995E-02	-.20165E-02	.27024E+03	.17908E-01	.15947E+00	.92404E+01 .21061E-01	.92404E+01 .21061E-01
4 1 8	.95479E-07	.62804F-03	.36469E-02	-.58206E-03	.91914E-03	.21621E+00	.16398E-01	.62122E-01	.93627E+01 0.	.93627E+01 0.
4 2 8	.10153E-06	.11279F-03	.39531E-03	-.13849E-02	-.27799E-01	.24100E+02	.89370E-02	.23943E+02	.21307E+02 0.	.21307E+02 0.
4 3 8	-.14324E-06	.73216F-04	.24013E-03	.13462E-02	-.22731E-01	.18673F+02	-.10714E-02	.18514E+02	.18594E+02 0.	.18594E+02 0.
4 4 8	.19763E-06	.11330F-03	.39945E-03	.37196E-02	-.27935E-01	.24247F+02	.11195E-01	.24091E+02	.21380E+02 0.	.21380E+02 0.
4 5 8	.39477E-06	.62815F-03	.37038E-02	-.24708E-02	.28223E-02	.18384F+00	.18702E-01	.15318E+00	.92509E+01 .21925E-01	.92509E+01 .21925E-01
5 1 8	.44576E-07	.62387F-03	.36463E-02	-.68121E-03	.34456E-03	.21433F+00	.20672E-01	.80805E-01	.93613E+01 0.	.93613E+01 0.
5 2 8	.94414E-07	.11193F-04	.39412E-03	.14937E-02	-.27961E-01	.24080F+02	.97735E-02	.23954E+02	.21285E+02 0.	.21285E+02 0.
5 3 8	-.14510E-06	.72794F-04	.23874E-03	.14206E-02	-.22691E-01	.18649F+02	-.34415E-03	.18524E+02	.18569E+02 0.	.18569E+02 0.
5 4 8	-.17830E-06	.11292F-03	.39845E-03	.32857E-02	-.27904E-01	.24225E+02	.10636E-01	.24101E+02	.21354E+02 0.	.21354E+02 0.

RESULTS FOR REEF PLANE (NOTE: I,J LOCATES LARGE SQUARE AND K,L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGVZ	SIGZZ	SIGXY	SIGX	SIGY	ENERGY REL.
5 5	E	.41362E-06	-.62402E-03	.37033E-02	-.14043E-02	-.14946E-02	-.24958E-02	-.21936E-01	-.13419E+00	.92496E+01 .21936E-01
I=6 J=1										
1 1	0	.17199E-06	-.77676E-05	.25459E-04	.24091E-02	-.13546E+01	.11199E+02	-.42455E-01	.10801E+02	.15057E+02 0.
1 2	0	.22244E-06	-.10355E-04	.33099E-04	.31826E-02	-.13906E+01	.11467E+02	-.52469E-01	.11176E+02	.15163E+02 0.
1 3	0	.28010E-06	-.13975E-04	.44501E-04	.37239E-02	-.14408E+01	.11868E+02	-.63750E-01	.11608E+02	.15329E+02 0.
1 4	0	.31406E-06	-.20807E-04	.66456E-04	.44485E-02	-.15360E+01	.12634E+02	-.72426E-01	.12417E+02	.15673E+02 0.
1 5	0	.36855E-06	-.30923E-04	.11989E-03	.50490E-02	-.17593E+01	.14505E+02	-.77849E-01	.14332E+02	.16544E+02 0.
2 1	0	.79089E-07	-.76279E-05	.25713E-04	.11245E-02	-.13581E+01	.11230E+02	-.18565E-01	.10914E+02	.15089E+02 0.
2 2	0	.10957E-06	-.10452E-04	.33463E-04	.15500E-02	-.13946E+01	.11501E+02	-.23521E-01	.11211E+02	.15199E+02 0.
2 3	0	.16987E-06	-.14126E-04	.45010E-04	.16886E-02	-.14455E+01	.11905E+02	-.28420E-01	.11646E+02	.15370E+02 0.
2 4	0	.16922E-06	-.37257E-04	.67166E-04	.22977E-02	-.15410E+01	.12681E+02	-.33160E-01	.12456E+02	.15723E+02 0.
2 5	0	.32325E-07	-.76482E-05	.12092E-03	.27549E-02	-.17667E+01	.14542E+02	-.36730E-01	.14375E+02	.16626E+02 0.
3 1	0	.33928E-07	-.10486E-04	.33599E-04	.43037E-03	-.13610E+01	.11255E+02	-.49010E-01	.10939E+02	.15121E+02 0.
3 2	0	.25300E-07	-.14183E-04	.45204E-04	.47212E-03	-.14489E+01	.11934E+02	-.33441E-02	.11673E+02	.15485E+02 0.
3 3	0	.20315E-07	-.21123E-04	.67447E-04	.28555E-03	-.15456E+01	.12712E+02	-.18909E-01	.12485E+02	.15761E+02 0.
3 4	0	.22723E-08	-.37399E-04	.12136E-03	.92423E-04	-.17711E+01	.14599E+02	-.67759E-03	.14407E+02	.16489E+02 0.
4 1	0	.14534E-06	-.78210E-05	.25727E-04	.20030E-02	-.13632E+01	.11274E+02	-.28503E-01	.10957E+02	.15150E+02 0.
4 2	0	.17822E-06	-.10445E-04	.33491E-04	.24250E-02	-.13997E+01	.11545E+02	-.32250E-01	.11255E+02	.15260E+02 0.
4 3	0	.19210E-06	-.14127E-04	.45066E-04	.27635E-02	-.14507E+01	.11950E+02	-.35527E-01	.11691E+02	.15431E+02 0.
4 4	0	.20977E-06	-.21048E-04	.67286E-04	.28413E-02	-.15471E+01	.12728E+02	-.37187E-01	.12504E+02	.15785E+02 0.
4 5	0	.20941E-06	-.37289E-04	.12120E-03	.29519E-02	-.17726E+01	.14615E+02	-.35755E-01	.14429E+02	.16698E+02 0.
5 1	0	.24352E-06	-.77340E-05	.25466E-04	.33643E-02	-.13647E+01	.11286E+02	-.52473E-01	.10967E+02	.15178E+02 0.
5 2	0	.29930E-06	-.10320E-04	.33128E-04	.41191E-02	-.14006E+01	.11544E+02	-.61402E-01	.11263E+02	.15284E+02 0.
5 3	0	.33687E-06	-.13955E-04	.44584E-04	.47042E-02	-.14509E+01	.11953E+02	-.70481E-01	.11698E+02	.15451E+02 0.
5 4	0	.36480E-06	-.20793E-04	.66660E-04	.51486E-02	-.15466E+01	.12728E+02	-.77170E-01	.12512E+02	.15796E+02 0.
5 5	0	.38426E-06	-.36985E-04	.12042E-03	.53523E-02	-.17706E+01	.14609E+02	-.77944E-01	.14439E+02	.16691E+02 0.
I=6 J=2										
1 1	0	.54438E-06	-.93729E-04	.33630E-03	.76527E-02	-.25486E+01	.22079E+02	-.10409E+00	.21837E+02	.20420E+02 0.
1 2	0	.13679E-05	-.59420E-03	.35097E-02	.16998E-02	-.12368E+03	.10445E+02	-.94042E-01	-.86260E-01	.93879E+01 0.
1 3	0	.86586E-06	-.76713E-03	.45901E-02	.34819E-03	-.98101E+03	.14678E+02	-.57523E-01	-.10279E-01	.93694E+01 0.
1 4	0	.21337E-06	-.82150E-03	.49188E-02	.15689E-02	.76191E+03	.17144E+02	-.14170E-01	.33486E-01	.93765E+01 0.
1 5	0	.57189E-07	-.78081E-03	.64498E-02	.29097E-03	.66025E+03	.18976E+02	-.29199E-01	.44423E-01	.93751E+01 0.
2 1	0	.33654E-06	-.94325E-04	.33023E-03	.44448E-02	-.25595E+01	.27168E+02	-.57422E-01	.21904E+02	.20806E+02 0.
2 2	0	.88391E-06	-.59474E-03	.35233E-02	.10338E-02	.42464E+03	.10900E+02	-.51799E-01	-.10634E+00	.94281E+01 0.
2 3	0	.55314E-06	-.77032E-03	.46074E-02	.16576E-04	-.47747E+03	.14698E+02	-.30201E-01	-.33867E-01	.94128E+01 0.
2 4	0	.42964E-07	-.82477E-03	.49372E-02	.15886E-02	.43433E+04	.17253E+02	-.63277E-02	.88215E-02	.94081E+01 0.
2 5	0	.61942E-07	-.78413E-03	.46676E-02	.24988E-03	.59827E+03	.19170E+02	-.17486E-01	.26522E-01	.94192E+01 0.
3 1	0	.43615E-07	-.94601E-04	.33923E-03	.70740E-03	-.25659E+01	.22225E+02	-.10783E-01	.21955E+02	.20560E+02 0.
3 2	0	.20803E-06	-.59820E-03	.35322E-02	.94294E-03	.55534E+03	.10903E+02	-.11447E-01	-.11231E+00	.94532E+01 0.
3 3	0	.62919E-07	-.77212E-03	.46188E-02	.39932E-03	.78187E+03	.14754E+02	-.59497E-02	.39613E-01	.94383E+01 0.
3 4	0	.22861E-06	-.82633E-03	.49494E-02	.17835E-02	.64459E+03	.17368E+02	-.14402E-02	.33319E-02	.94345E+01 0.
3 5	0	.84405E-07	-.78589E-03	.66793E-02	.32974E-03	.12275E-02	.19168E+02	-.80092E-02	.20533E-01	.94443E+01 0.
4 1	0	.24927E-06	-.94500E-04	.33919E-03	.31126E-02	-.25670E+01	.22245E+02	-.34840E-01	.21984E+02	.20581E+02 0.
4 2	0	.45547E-06	-.59830E-03	.35351E-02	.94367E-03	.77318E+03	.10874E+02	-.29533E-01	-.10249E+00	.94422E+01 0.
4 3	0	.64895E-06	-.77217E-03	.46225E-02	.50299E-03	-.12340E+02	.14763E+02	-.20308E-01	-.28064E-01	.94461E+01 0.
4 4	0	.45219E-06	-.82649E-03	.49535E-02	.11353E-02	-.18782E-02	.17994E+02	-.92497E-02	.14814E-01	.94412E+01 0.
4 5	0	.16145E-06	-.78629E-03	.66810E-02	.20615E-03	.24123E+02	.19126E+02	-.17136E-02	.31616E-01	.94518E+01 0.
5 1	0	.47159E-06	-.94022E-04	.33813E-03	.64839E-02	-.25632E+01	.22230E+02	-.89173E-01	.21993E+02	.20567E+02 0.
5 2	0	.88765E-06	-.59712E-03	.35326E-02	.12352E-02	.58104E+03	.17709E+02	-.73404E-01	-.77291E-01	.94547E+01 0.
5 3	0	.15264E-06	-.77070E-03	.46198E-02	.14130E-02	-.21511E+02	.14693E+02	-.48455E-01	.12583E-02	.94349E+01 0.

RESULTS FOR REEF PLANE (NOTE: I,J LOCATES LARGE SQUARE AND K,L LOCATES SMALL SQUARE.)

K L CODE	DA	DV	DZ	SIGXZ	SIOYZ	SIGZZ	SIGVY	SIGXK	SIGVY	ENERGY REL.
5 4 8	-.79990E-06	-.02551E-03	.49506E-02	.27071E-02	.18357E-02	.17189F+00	.17287E-01	.45507E-01	.94275E+01 0.	
5 5 8	-.15535E-06	-.78463E-03	.46790E-02	-.14083E-03	-.18863E-04	.18976E+00	-.14055E-01	.60799E-01	.94403E+01 0.	
I= 6 J= 3										
1 1 8	.13402E-06	-.62552E-03	.36554E-02	-.60121E-03	.29924E-03	.21649F+00	.19495E-02	.76561E-01	.93871E+01 0.	
1 2 8	-.10787E-06	-.11230E-03	.39532E-03	-.12699E-02	-.28041E-01	.24144E+02	.76112E-02	.24010E-02	.21346E+02 0.	
1 3 8	-.14081E-06	-.73079E-04	.23968E-03	.14509E-02	.22759E-01	.18700F+02	-.61172E-02	.18655E-02	.18623E+02 0.	
1 4 8	-.18005E-06	-.11327E-03	.39959E-03	.34573E-02	.27987E-01	.24291E+02	.16012E-01	.24158E-02	.21411E+02 0.	
1 5 8	.45702E-06	-.62573E-03	.37125E-02	-.25994E-02	.15720E-02	-.96391F+04	.10022E-01	.13798E+00	.92768E+01	.22842E-01
2 1 8	.85627E-07	-.62841E-03	.36712E-02	-.65641E-03	.27632E-03	.21804F+00	.52447E-02	.59301E-01	.94259E+01 0.	
2 2 8	-.10112E-06	-.11314E-03	.39807E-03	.12516E-02	.28186E-01	.24242F+02	.75174E-02	.24099E+02	.21452E+02 0.	
2 3 8	-.13209E-06	-.73800F+04	.24190E-03	.14528E-02	.22888E-01	.18799F+02	.34437E-02	.18636E-02	.18721E+02 0.	
2 4 8	-.15616E-06	-.11415E-03	.40232E-03	.36489E-02	.28131E-01	.24410F+02	.14527E-01	.24249E+02	.21525E+02 0.	
2 5 8	.53437E-06	-.62873E-03	.37290E-02	-.24365E-02	.92139E-03	-.61131F+02	.12074E-01	.15937E+00	.93113E+01	.22216E-01
3 1 8	.22321E-07	-.62999F+03	.36810E-02	-.52988E-03	.20262E-04	.21898F+00	.76070E-02	.54555E-01	.94513E+01 0.	
3 2 8	-.10312E-06	-.11351F-03	.39941E-03	-.11951E-02	.28268E-01	.24330F+02	.55195E-02	.24159E+02	.21513E+02 0.	
3 3 8	-.12715E-06	-.74089F+04	.24286E-03	.14593E-02	.22957E-01	.18855E+02	-.28122E-02	.18683E+02	.18777E+02 0.	
3 4 8	-.16192E-06	-.11456E-03	.40378E-03	.37186E-02	.28209E-01	.24478E+02	.11191E-01	.24309E+02	.21585E+02 0.	
3 5 8	.56415E-06	-.63032F-03	.37388E-02	-.21967E-02	.17886E-02	-.60595E-03	.13722E-01	.16267E+00	.93394E+01	.22329E-01
4 1 8	.17762E-07	-.62989E-03	.36833E-02	-.59538E-03	.89353E-03	.21843F+00	.9453E-02	.64935E-01	.94593E+01 0.	
4 2 8	-.11567E-06	-.11325F-03	.39919E-03	-.11764E-02	.28269E-01	.24344F+02	.31644E-02	.24185E+02	.21927E+02 0.	
4 3 8	-.12090E-06	-.73897F+04	.24250E-03	.14861E-02	.22957E-01	.18844F+02	-.22944E-02	.18705E+02	.18788E+02 0.	
4 4 8	-.16032E-06	-.11439E-03	.40343E-03	.38315E-02	.28213E-01	.24494E+02	.76423E-02	.24336E+02	.21602E+02 0.	
4 5 8	.65747E-06	-.63028F-03	.37413E-02	-.24773E-02	.25077E-02	-.19929F+02	.14169E-01	.15311E+00	.93467E+01	.22378E-01
5 1 8	.43647E-07	-.62852E-03	.36791E-02	-.65778E-03	.42245E-03	.21428E+00	.11803E-01	.88882E-01	.94521E+01 0.	
5 2 8	.12334E-06	-.11267E-03	.39749E-03	-.10930E-02	.28194E-01	.24306E+02	.17573E-02	.24180E+02	.21495E+02 0.	
5 3 8	-.11740E-06	-.73272F+04	.24077E-03	.14198E-02	.22889E-01	.18828F+02	-.15455E-02	.18701E+02	.18757E+02 0.	
5 4 8	-.14212E-06	-.11374E-03	.40191E-03	.38553E-02	.28143E-01	.24444E+02	.50415E-02	.24329E+02	.21567E+02 0.	
5 5 8	.68090E-06	-.62903E-03	.37370E-02	-.17891E-02	.12675E-02	-.31404E-02	-.15344E-01	.12880E+00	.93396E+01	.22359E-01
I= 6 J= 4										
1 1 E	.57411E-06	-.78137F-03	.47215E-02	-.33452E-02	.90883E-03	.16604E-02	-.33945E-01	-.14269E+00	.92441E+01	.26439E-01
1 2 E	-.82690E-06	-.82138F-03	.49912E-02	.64743E-02	-.53133E-02	.18903F+02	.11100E-01	.13877E+00	.92805E+01	.27617E-01
1 3 E	-.59475E-06	-.76883F-03	.46533E-02	-.25255E-02	.91863E-02	.12219F+02	.55844E-01	.16101E+00	.92981E+01	.25997E-01
1 4 E	-.75883E-06	-.59360F-03	.35527E-02	-.25359E-02	.89925E-02	.35546F+02	.92882E-01	.19056E+00	.93388E+01	.19474E-01
1 5 E	-.68788E-06	-.94326E-04	.34043E-03	-.46546E-02	.25454E-01	.22223F+02	.10719E+00	.21977E+02	.28496E+02 0.	
2 1 E	.59332E-06	-.78477F-03	.47400E-02	-.33354E-02	.20056E-02	-.12476F+03	.21048E-01	.16735E+00	.93253F+01	.26604E-01
2 2 E	-.67038E-06	-.82491F-03	.50104E-02	.68351E-02	.42225E-02	.16109E+02	.34869E-02	.16662E+00	.93233E+01	.27788E-01
2 3 E	-.12457E-06	-.77207E-03	.46711E-02	-.29441E-02	.95354E-02	.23922E-02	.27936E-01	.18952E+00	.93401E+01	.25753E-01
2 4 E	-.60122E-06	-.59627F-03	.35670E-02	.15151E-02	.75729E-02	.13106F+03	.50995E-01	.21815E+00	.93761E+01	.19595E-01
2 5 E	-.40506E-06	-.94824F-04	.34243E-03	-.24688E-02	.25583E-01	.22314F+02	.56792E-01	.22046E+02	.93582E+02 0.	
3 1 E	.47946E-06	-.78654F-03	.47520E-02	-.24600E-02	.39935E-03	.69250F+02	.11700E-01	.17358E+00	.93520E+01	.26728E-01
3 2 E	-.37420E-06	-.82469F-03	.50228E-02	.68474E-02	.72341E-02	.84387F+03	.43261E-02	.17234E+00	.93510E+01	.27913E-01
3 3 E	.47083E-06	-.77375F-03	.46827E-02	-.33604E-02	.70299E-02	.91222F+03	.25875E-02	.19120E+00	.93672E+01	.25879E-01
3 4 E	-.21045E-06	-.59745F-03	.35761E-02	-.21045E-02	.91095E-02	.49222F+04	.92434E-02	.24460E+00	.94019E+01	.19682E-01
3 5 E	-.55714E-07	-.94988E-04	.34342E-03	.96144E-03	.25662E-01	.22172F+02	.85401E-02	.22098E+02	.20637E+02 0.	
4 1 E	.73061E-06	-.78697F-03	.47558E-02	-.35387E-02	.22865E-02	.30412F+03	.12107E-02	.16240E+00	.93594E+01	.26798E-01
4 2 E	.19080E-05	-.82717F-03	.50270E-02	.63023E-02	.45771E-02	.15153F+02	.12776E-01	.16014E+00	.93590E+01	.27902E-01
4 3 E	.10400E-05	-.87411F-03	.46867E-02	-.35878E-02	.82353E-02	-.98556F+03	.23036E-01	.18046E+00	.93755E+01	.25841E-01
4 4 E	.74249E-06	-.59796F-03	.35789E-02	-.15727E-02	.74647E-02	.17948F+02	.32073E-01	.21352E+00	.94128E+01	.19739E-01
4 5 E	.21453E-06	-.94915E-04	.34336E-03	.50214E-02	.25671E-01	.22333F+02	.39802E-01	.22127E+02	.26659E+02 0.	
5 1 E	.72025E-06	-.78555F-03	.47526E-02	-.27909E-02	.40049E-03	.16196F+02	.11096E-01	.13239E+00	.93504E+01	.26882E-01
5 2 E	.26095E-06	-.82587F-03	.50243E-02	.59772E-02	-.53589E-02	.12102F+02	-.20228E-01	.17887E+00	.93462E+01	.28021E-01

RESULTS FOR REEF PLANE (NOTE: I-J LOCATES LARGE SQUARE AND K-L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGX	SIGY	ENERGY REL.
5 3 E	.14093E-05	-.77302E-03	.46843E-02	-.30555E-02	.R8924E-02	-.31054F-02	-.51122E-01	-.15250E+00	.93634E+01	.25972E-01
5 4 E	.14750E-05	-.59694E-03	.35765E-02	.18992E-02	.82068E-02	.70846F-03	-.78439E-01	-.18833E+00	.94052E+01	.19762E-01
5 5 E	.38994E-06	-.94385E-04	.34240E-03	.R8913E-02	-.25649E+01	.22378E-02	-.92142E-01	-.22137E+02	.20645E+02	0.
I= 6 J= 5										
1 1 E	-.49833E-06	-.37384E-04	.12147E-03	-.37035E-02	-.17586E+01	.14557F-02	.79736E-01	.14382E+02	.16592E+02	0.
1 2 E	.28200E-06	-.20951F-04	.67294E-04	.47265E-02	.15375E+01	.12643F-02	.74161E-01	.12442E+02	.15691E+02	0.
1 3 E	-.20759E-06	.14047E-04	.45033E-04	.41017E-02	.14421E+01	.11884F-02	.64798E-01	.11623E+02	.15342E+02	0.
1 4 E	-.18586E-06	-.10407F-04	.33474E-04	.31046E-02	.13917E+01	.11404F-02	.54023E-01	.11185E+02	.15174E+02	0.
1 5 E	-.10614E-06	.78629F-05	.25740E-04	.28047E-02	.13552E+01	.11209F-02	.43449E-01	.10886E+02	.15066E+02	0.
2 1 E	-.33715E-06	-.37837F-04	.12253E-03	.13833E-02	.17654E+01	.14615F-02	.30029E-01	.14425E+02	.16654E+02	0.
2 2 E	.14497E-06	-.21223E-04	.68037E-04	.25366E-02	.15431E+01	.12710F-02	.34939E-01	.12482E+02	.15741E+02	0.
2 3 E	.86416E-07	.14206F-04	.45563E-04	.21767E-02	.14668E+01	.11244E-02	.29494E-01	.11661E+02	.15384E+02	0.
2 4 E	.80624E-07	.10508E-04	.33851E-04	.14705E-02	.13958E+01	.11515F-02	.24492E-01	.11220E+02	.15210E+02	0.
2 5 E	-.21323E-07	.79244F-05	.26004E-04	.14787E-02	.13587E+01	.11240F-02	.19446E-01	.10919E+02	.15099E+02	0.
3 1 E	-.12826E-06	-.37998F-04	.12297E-03	.14415E-02	.17703E+01	.14533E-02	.14183E-01	.11688E+02	.15418E+02	0.
3 2 E	.39603E-07	-.21337F-04	.68325E-04	.49095E-04	.15472E+01	.12742F-02	.27339E-02	.11247E+02	.15243E+02	0.
3 3 E	.76605E-07	.14273F-04	.45762E-04	.46565E-04	.14504E+01	.11953E-02	.36948E-02	.12511E+02	.15779E+02	0.
3 4 E	.56720E-07	.10545E-04	.33991E-04	.47677E-03	.13908E+01	.11541E-02	.34040E-02	.11688E+02	.15418E+02	0.
3 5 E	.87799E-07	.79817F-05	.26109E-04	.51507E-04	.13616E+01	.12655E-02	.43121E-02	.10944E+02	.15130E+02	0.
4 1 E	.17906E-07	-.38137F-05	.12286E-03	.66619E-02	.17687E+01	.14688E-02	.35392E-01	.14479E+02	.16720E+02	0.
4 2 E	.15697E-06	-.21439E-04	.68215E-04	.33645E-02	.15468E+01	.12757E-02	.34966E-01	.12530E+02	.15803E+02	0.
4 3 E	.19224E-06	.14302E-04	.45663E-04	.29080E-02	.14514E+01	.11970F-02	.35139E-01	.11706E+02	.15443E+02	0.
4 4 E	.16728E-06	.10542E-04	.33908E-04	.27908E-02	.14007E+01	.11599E-02	.32039E-01	.11264E+02	.15271E+02	0.
4 5 E	.18267E-06	.79409F-05	.26037E-04	.17857E-02	.13638E+01	.11284E-02	.28251E-01	.10962E+02	.15160E+02	0.
5 1 E	.40723E-06	.37223E-04	.12209E-03	.50813E-02	.17739E+01	.14664E-02	.78873E-01	.14491E+02	.16721E+02	0.
5 2 E	.88388E-06	.20972E-04	.67519E-04	.41587E-02	.15487E+01	.12758E-02	.77458E-01	.12533E+02	.15819E+02	0.
5 3 E	.43230E-06	.14067F-04	.45144E-04	.61452E-02	.14525E+01	.11975E-02	.70070E-01	.11714E+02	.15465E+02	0.
5 4 E	.34122E-06	.10609F-04	.33529E-04	.41074E-02	.14019E+01	.11568F-02	.61094E-01	.11273E+02	.15296E+02	0.
5 5 E	.32800E-06	-.78632E-05	.25765E-04	.27993E-02	.13653E+01	.11297E-02	-.52907E-01	.10973E+02	.15188E+02	0.

I= 7 J= 3

1 1 E	.88355E-07	-.62750F-03	.36657E-02	-.62096E-03	.24151E-03	.21508E+00	-.11457E-01	.11201E+00	.94454E+01	0.
1 2 E	.16016E-06	-.11212F-03	.39657E-03	.55371E-03	.20147E+01	.24296F-02	.68427E-02	.24204E+02	.21474E+02	0.
1 3 E	-.89361E-07	.72747F-04	.23988E-03	.23545E-02	.22843E+01	.18015E-02	.92441E-02	.18723E+02	.18734E+02	0.
1 4 E	-.11584E-06	-.11320F-03	.40036E-03	.45808E-02	.28102E+01	.24446F-02	.14030E-01	.24355E+02	.21598E+02	0.
1 5 E	.80569E-06	.62823E-03	.37365E-02	.26484E-02	.13581E-02	.27548F-02	.68503E-02	-.10235E+00	.93369E+01	.22359E-01
2 1 E	.30559E-07	.62901E-03	.36903E-02	.66653E-03	.17947E-02	.21565E+00	.72799E-02	.24274E+02	.21570E+02	0.
2 2 E	.15357E-06	.11264F-03	.39875E-03	.52844E-03	.28247E+01	.24394F-02	.34950E-02	.18781E+02	.18829E+02	0.
2 3 E	.73037E-07	.73237F-04	.24171E-03	.24563E-02	.22841E+01	.18001E-02	.88454E-02	.24627E+02	.21644E+02	0.
2 4 E	.75817E-07	.11376F-03	.40309E-03	.48048E-02	.28205E+01	.24546F-02	.14155E-01	.24627E+02	.21644E+02	0.
2 5 E	.92744E-06	.63002F-03	.37498E-02	.24435E-02	.61700E-03	.43101F-02	.10777E-01	-.11813E+00	.93659E+01	.22500E-01
3 1 E	.13347E-07	.62938F-03	.36968E-02	.58129E-03	.15518E+03	.21586F+00	.60985E-02	.99204E+01	.94980E+01	0.
3 2 E	.16535E-06	-.11272F-03	.39956E-03	.34409E-03	.28285E+01	.24444F-02	.67017E-02	.24318E+02	.21421E+02	0.
3 3 E	.60408E-07	.73330F-04	.24231E-03	.25680E-02	.22982E+01	.18945E-02	.86452E-02	.18816E+02	.18874E+02	0.
3 4 E	.73372E-07	.11391F-03	.40408E-03	.49817E-02	.28246E+01	.24596E-02	.10483E-01	.24670E+02	.21497E+02	0.
3 5 E	.73748E-06	.63057F-03	.37555E-02	.21988E-02	.13467E-02	.39150F-02	.11085E-01	-.11714E+00	.93900E+01	.22589E-01
4 1 E	.97496E-08	.62778F-03	.36944E-02	.59685E-03	.78737E+03	.21444F+00	.81136E-02	.11491E+00	.94944E+01	0.
4 2 E	.19892E-06	.71218E-03	.39849E-03	.21047E-04	.28241E+01	.24435E-02	.12427E-01	.24322E+02	.21622E+02	0.
4 3 E	.45098E-07	.72902F-04	.24153E-03	.27433E-02	.22550E+01	.18939F-02	.86503E-02	.18822E+02	.18874E+02	0.
4 4 E	.71466E-07	.11345F-03	.40309E-03	.51029E-02	.28209E+01	.24591E-02	.51472E-02	.24478E+02	.21701E+02	0.
4 5 E	.10482E-05	.62931F-03	.37538E-02	.24936E-02	.21599E-02	.17568F-02	.93687E-02	-.12738E+00	.93944E+01	.22666E-01
5 1 E	.36214E-07	-.62415F-03	.36827E-02	.59678E-03	.61347E-03	.21077F-02	.13827E-01	.14273E+00	.94444E+01	0.

RESULTS FOR REEF PLANE (NOTE: I,J LOCATES LARGE SQUARE AND K,L LOCATES SMALL SQUARE.)

K L CODE	DX	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGXZ	SIGYY	ENERGY REL.
5 2 *	.24714E-06	-.11101E-03	.39592E-03	.65928E-03	-.28093E-01	.243A0F-02	-.20429E-01	.242A1E-02	.21578E+02	0.
5 3 *	-.23831E-07	-.71932E-04	.23914E-03	.30809E-02	-.22832E-01	.188A0F-02	-.87907E-02	.18796E-02	.18835E+02	0.
5 4 *	-.52441E-07	-.11235E-03	.40069E-03	.50795E-02	-.28075E-01	.24517F-02	.20165E-02	.24438E-02	.21449E+02	0.
5 5 E	.11293E-05	-.62622E-03	.37428E-02	-.17821E-02	-.81270E-03	-.26295F-02	-.53706E-02	-.68667E-01	.93765E+01	.22540E-01

CP TIME TO CALCULATE REEF STRESSES AND PRINT RESULTS= 22.875

CP TIME FOR MINING STEP 2 = 111.143

***** MINING STEP NUMBER 3 *****

STEP DESCRIPTION
MINING STEP NO. 3

MINING PATTERN
MINING PATTERN IS PRINTED
THE NUMBER OF ADDITIONAL ELEMENTS EXCAVATED = 60
THE NUMBER OF ADDITIONAL BACKFILL ELEMENTS CREATED = 100
THE NUMBER OF BACKFILL ELEMENTS EXCAVATED = 0

PRINT PATTERN FOR IN-REEF RESULTS
 DO A SELECTIVE PRINT OF REEF RESULTS USING PRINT PATTERN FROM PREVIOUS MINING STEP
 OUTPUT PRINT PATTERN

PRINT PATTERN FOR MINING STEP 3

	1	2	3	4	5
1	N	N	N	N	N
2	N	N	N	N	N
3	N	N	N	N	N
4	N	N	P	N	N
5	N	N	P	N	N
6	P	P	P	P	P
7	N	N	P	N	N
8	N	N	N	N	N
9	N	N	N	N	N
10	N	N	N	N	N

SOLVING FOR CLOSURES AND WIDES FOR MINING STEP 3

ITERATION PROCESS FOR CLOSURES CONVERGED AFTER 9 ITERATIONS.
 CP TIME= 33.135
 ITERATION PROCESS FOR RIDES CONVERGED AFTER 6 ITERATIONS.
 CP TIME= 59.532

RESULTS FROM REEF PLANE (NOTE: I, J LOCATES LARGE SQUARE AND K, L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGXX	SIGYY	ENERGY REL.
I= 4	J= 3									
1 1	0	20252E-05	13551F-02	77006E-02	11067E-01	80213E-02	31321F-01	30569E-01	97881E-01	0.
1 2	E	15213E-05	14002F-02	A3546E-02	13926E-02	12545E-01	33578F-02	79566E-00	81542E-01	99627E-01
1 3	E	13106E-05	14119E-02	A5210E-02	10920E-01	70627E-02	15020F-01	80138E-00	81380E-01	78779E-01
1 4	E	15871E-05	13999F-02	A3754E-02	42913E-02	55841E-02	11354E-01	80532E-00	81586E-01	10042E-00
1 5	0	29714E-05	13575F-02	77597E-02	93200E-03	35554E-02	29235E-01	36524E-01	96797E-01	0.
2 1	0	85424E-06	13666F-02	77496F-02	14269E-01	64696E-02	31552E-01	38426E-01	98562E-01	0.
2 2	E	19272E-06	14117E-02	A4079E-02	48208E-03	12639E-01	42909E-02	78666E-00	82086E-01	10100E-00
2 3	E	10196E-05	14230F-02	A5761E-02	81520E-02	10265E-01	10216E-01	79633E-00	81851E-01	79879E-01
2 4	E	22817E-06	14112F-02	A4305E-02	27209E-02	58562E-02	27888F-02	76653E-00	82037E-01	10183E-00
2 5	0	58735E-06	13679E-02	78113E-02	17083E-02	34024E-02	33042E-01	76310E-01	97424E-01	0.
3 1	E	37796E-05	13681F-02	77596E-02	13681E-01	11922E-01	31537F-01	38502E-01	98656E-01	0.
3 2	E	12671E-05	14125E-02	84169E-02	14727E-02	61062E-02	81869F-03	77555E-00	82085E-01	10155E-00
3 3	E	98747E-06	14238F-02	A5050E-02	79678E-02	14179E-01	29455F-02	80962E-00	81801E-01	80231E-00
3 4	E	15255E-05	14124E-02	A4400E-02	11740E-02	36037E-02	93894F-04	78008E-00	82050E-01	10239E-00
3 5	0	26271E-05	13698E-02	78234E-02	90021E-04	83950E-03	29240F-01	36283E-01	97430E-01	0.
4 1	0	71145E-05	14035F-02	77259E-02	13643E-01	11218E-02	31149F-01	38719E-01	80050E-01	0.
4 2	E	33603E-05	14038E-02	83756E-02	93078E-03	17265E-01	27235E-01	38719E-01	80050E-01	0.
4 3	E	70115E-06	14145E-02	A5403E-02	58764E-02	47297E-02	15901F-01	82761E-00	81350E-01	10124E-00
4 4	E	32630E-05	14031F-02	A3987E-02	19553E-02	10730E-01	29651F-01	36481E-01	81055E-01	80027E-01
4 5	0	58698E-05	13610E-02	77899E-02	15802E-02	27585E-02	28828F-01	36481E-01	96889E-01	10210E-00
5 1	E	10623E-04	1303F-02	76426E-02	92271E-02	13262E-01	30354F-01	39079E-01	96889E-01	0.
5 2	E	51852E-05	13816F-02	A2726E-02	20881E-02	14790E-01	45056E-01	39079E-01	96889E-01	0.
5 3	E	80592E-06	13919E-02	A4302E-02	64052E-02	11097E-02	10748F-01	10155E-01	79801E-01	10000E-00
5 4	E	54800E-05	13804F-02	82918E-02	11806E-02	46635E-02	94435F-03	80129E-00	80410E-01	78953E-01
5 5	0	98101E-05	13423E-02	77021E-02	96240E-03	86426E-02	28540E-01	37120E-01	95987E-01	10000E-00
I= 5	J= 3									
1 1	0	14317E-04	13110F-02	75010E-02	89728E-02	16579E-02	29400E-01	40183E-01	94347E-01	0.
1 2	E	75687E-05	13465F-02	A0925E-02	68108E-03	24403E-01	79257F-02	12818E-01	77730E-01	98408E-01
1 3	E	11593E-05	13539F-02	A2390E-02	11783E-01	53726E-02	48646E-01	13889E-01	77270E-01	77650E-01
1 4	E	72589E-05	13449E-02	A1141E-02	49330E-02	16925E-01	46020E-01	13061E-01	78058E-01	99277E-01
1 5	0	13365E-04	13114F-02	75664E-02	21442E-02	96109E-02	27203F-01	37898E-01	93334E-01	0.
2 1	0	21956E-04	12752F-02	73298E-02	15162E-01	32261E-02	28434E-01	40520E-01	92751E-01	0.
2 2	E	12522E-04	13001F-02	78708E-02	15162E-01	27623E-02	28434E-01	15646E-01	75297E-01	96238E-01
2 3	E	81023E-07	13021F-02	A0062E-02	67605E-03	1909E-01	54099E-02	15646E-01	75297E-01	96238E-01
2 4	E	11110E-04	12961F-02	79028E-02	84937E-02	41559E-01	49773E-01	16833E-01	73707E-01	75896E-01
2 5	0	12043E-04	12712F-02	74012E-02	17894E-02	49405E-01	21427F-01	15147E-01	74727E-01	97177E-01
3 1	E	31734E-04	12186F-02	70549E-02	21510E-01	38172E-01	26231E-01	38101E-01	91543E-01	0.
3 2	E	17852E-04	12285F-02	74996E-02	10056E-02	14261E-01	41475E-01	40493E-01	89466E-01	0.
3 3	E	16896E-05	12282F-02	75970E-02	14080E-01	97915E-02	14374E-01	20175E-01	70016E-01	91982E-01
3 4	E	29533E-04	12336F-02	75232E-02	10617E-01	42954E-01	27841E-01	22895E-01	67673E-01	72256E-01
3 5	0	29285E-04	12263F-02	71287E-02	50964E-02	44738E-01	24001F-01	20565E-01	70448E-01	92817E-01
4 1	E	42751E-04	11426F-02	66031E-02	12445E-01	27379E-02	22675F-01	38047E-01	86708E-01	0.
4 2	E	25953E-04	11153F-02	68237E-02	55234E-02	21132E-01	10107E-01	29715E-01	81478E-01	83766E-01
4 3	E	63191E-06	10994F-02	68445F-02	59947E-02	12874E-01	11017E-01	34772E-01	86385E-01	65153E-01
4 4	E	25217E-04	11125F-02	68574E-02	15304E-01	13215E-01	10550F-01	29525E-01	81322E-01	84688E-01
4 5	0	41837E-04	11422F-02	66822E-02	27306E-02	13945E-01	20877E-01	36497E-01	85823E-01	0.
5 1	0	54652E-04	10285F-02	58651E-02	79172E-02	20751E-01	18227E-01	32269E-01	90055E-01	67077E-01
5 2	E	35709E-04	89936E-03	54684E-02	20644E-02	34474E-01	39703E-01	51195E-01	39407E-01	50422E-01
5 3	E	69704E-06	85214F-03	53039E-02	47664E-02	24266E-01	11157E-01	55336E-01	36029E-01	50422E-01
5 4	E	30406E-04	89652E-03	55021E-02	35920E-02	77343E-02	23474E-02	51875E-01	39354E-01	67894E-01

RESULT IS FUN REEF PLANE (NOTE: I,J LOCATES LARGE SQUARE AND K,L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	STOYZ	SIGZZ	STOXY	SIGXX	STOYY	ENERGY REL.
5 5 8	.53650E-04	-.10200F-02	.59670E-02	.33117E-02	-.65063E-02	.15047F-01	-.32000E+01	.25333E+01	.09634E+01	0.
I= 6 J= 1										
1 1 1	-.85787E-06	-.10000F-04	.34501E-04	-.11919E-01	-.13979E+01	.11516F-02	.13431E+00	.11174E-02	.15239E+02	0.
1 1 2	-.10702E-05	.14141E-04	.43601E-04	-.14071E-01	-.14432E+01	.11034F-02	.12993E+00	.11524E-02	.15307E+02	0.
1 1 3	-.13198E-05	-.18407F-04	.56688E-04	-.10350E-01	-.15037E+01	.12202F-02	.13902E+00	.12021E-02	.15506E+02	0.
1 1 4	-.17742E-05	.26649F-04	.01650E-04	-.24692E-01	-.16170E+01	.13167F-02	.14031E+00	.12942E-02	.15946E+02	0.
1 1 5	-.27673E-05	.46573F-04	.14217E-03	-.30458E-01	-.18023E+01	.15205F-02	.18035E+00	.15111E-02	.16055E+02	0.
2 1 1	-.95000E-06	.10050E-04	.34429E-04	-.13307E-01	-.14002E+01	.11539F-02	.15954E+00	.11195E-02	.15266E+02	0.
2 1 2	-.11935E-05	.14110F-04	.43471E-04	-.16506E-01	-.14450E+01	.11051F-02	.16315E+00	.11539E-02	.15394E+02	0.
2 1 3	-.14533E-05	.18449F-04	.56462E-04	-.20170E-01	-.15058E+01	.12308F-02	.17203E+00	.12028E-02	.15590E+02	0.
2 1 4	-.18406E-05	.26550F-04	.01150E-04	-.26295E-01	-.16184E+01	.13171F-02	.19003E+00	.12920E-02	.15906E+02	0.
2 1 5	-.27957E-05	.46417F-04	.14071E-03	-.30001E-01	-.18006E+01	.15254F-02	.22420E+00	.15048E-02	.16094E+02	0.
3 1 1	-.10700E-05	.10020F-04	.34310E-04	-.14058E-01	-.14029E+01	.11535E-02	.18669E+00	.11209E-02	.15297E+02	0.
3 1 2	-.13274E-05	.14040F-04	.43270E-04	-.16437E-01	-.14673E+01	.11060F-02	.19250E+00	.11549E-02	.15427E+02	0.
3 1 3	-.15805E-05	.18369F-04	.56101E-04	-.22030E-01	-.15072E+01	.12315F-02	.20464E+00	.12028E-02	.15622E+02	0.
3 1 4	-.19903E-05	.26360F-04	.00437E-04	-.27711E-01	-.16184E+01	.13167F-02	.22165E+00	.12911E-02	.16170E+02	0.
3 1 5	-.27909E-05	.46963F-04	.13907E-03	-.30606E-01	-.18760E+01	.15220F-02	.25509E+00	.14992E-02	.17014E+02	0.
4 1 1	-.11720E-05	.10747F-04	.34032E-04	-.16270E-01	-.14039E+01	.11564E-02	.20908E+00	.11217E-02	.15320E+02	0.
4 1 2	-.14436E-05	.13923F-04	.42829E-04	-.20033E-01	-.14407E+01	.11872F-02	.22040E+00	.11551E-02	.15454E+02	0.
4 1 3	-.16904E-05	.18151F-04	.55429E-04	-.23533E-01	-.15067E+01	.12313E-02	.23492E+00	.12021E-02	.15645E+02	0.
4 1 4	-.20630E-05	.26002F-04	.00793E-04	-.24643E-01	-.16159E+01	.13151F-02	.25173E+00	.12890E-02	.16033E+02	0.
4 1 5	-.27599E-05	.46267F-04	.13705E-03	-.30079E-01	-.18694E+01	.15171F-02	.27994E+00	.14939E-02	.17014E+02	0.
5 1 1	-.12309E-05	.10553F-04	.33459E-04	-.17192E-01	-.14038E+01	.11564E-02	.23409E+00	.11217E-02	.15348E+02	0.
5 1 2	-.15037E-05	.13629F-04	.42010E-04	-.20873E-01	-.14465E+01	.11865F-02	.24064E+00	.11543E-02	.15471E+02	0.
5 1 3	-.17430E-05	.17737F-04	.54305E-04	-.24170E-01	-.15036E+01	.12294F-02	.26474E+00	.12005E-02	.15655E+02	0.
5 1 4	-.20650E-05	.25392F-04	.00774E-04	-.26693E-01	-.16101E+01	.13110F-02	.28708E+00	.12861E-02	.16029E+02	0.
5 1 5	-.26441E-05	.43274F-04	.13450E-03	-.30455E-01	-.18502E+01	.15103F-02	.31035E+00	.14005E-02	.16906E+02	0.
I= 6 J= 2										
1 1 1	-.57129E-05	-.11304E-03	.39035E-03	-.79156E-01	-.28297E+01	.25970E-02	.37701E+00	.23675E-02	.21431E+02	0.
1 1 2	-.22195E-04	.68725E-03	.38038E-02	.74280E-02	-.16672E-03	.38771E-00	.55930E+00	.10377E-00	.96167E+01	0.
1 1 3	-.30135E-04	.90757F-03	.51679E-02	-.60518E-02	.13134E-01	.53308F-00	.77977E+00	.24610E-00	.96924E+01	0.
1 1 4	-.37733E-04	.10000E-02	.56943E-02	.44268E-02	-.19903E-01	.72812F-00	.11260E+01	.34215E-00	.98090E+01	0.
1 1 5	-.44610E-04	.10000E-02	.56510E-02	.40608E-02	.97595E-02	.80069F-00	.17178F+01	.10709E-00	.10353E+02	0.
2 1 1	-.55308E-05	.11255F-03	.38415E-03	.75302E-01	-.28135E+01	.23702E-02	.41108E+00	.23383E-02	.21448E+02	0.
2 1 2	-.20095E-04	.67804F-03	.38304F-02	.29234E-02	.57438E-03	.33070F-00	.55420E+00	.75210E-01	.97295E+01	0.
2 1 3	-.26904E-04	.89029F-03	.50642E-02	.12927E-02	.62550E-02	.45434E-00	.70509E+00	-.22053E-01	.98617E+01	0.
2 1 4	-.31315E-04	.97370F-03	.55184E-02	.55602E-02	-.11032E-01	.50068F-00	.89413E+00	.84572E-01	.10126E+02	0.
2 1 5	-.33143E-04	.96039F-03	.53510E-02	.31764E-02	.38138E-02	.64539E-00	.10005E+01	.46650E-00	.10623E+02	0.
3 1 1	-.52063E-05	.11100F-03	.37029E-03	.71252E-01	-.27951E+01	.23597F-02	.42220E+00	.23130E-02	.21435E+02	0.
3 1 2	-.17874E-04	.67013F-03	.37845E-02	.13214E-02	.17854E-03	.28680F-00	.52083E+00	.19121E-00	.97089E+01	0.
3 1 3	-.23006E-04	.87457F-03	.49802E-02	.22317E-03	.34599E-02	.39424F-00	.59253E+00	.16507E+00	.99338E+01	0.
3 1 4	-.24593E-04	.94904F-03	.53879E-02	.40601E-02	.64403E-02	.40421F-00	.64473E+00	.24900E-00	.10153E+02	0.
3 1 5	-.23070E-04	.92313F-03	.51603E-02	.85114E-03	.26228E-02	.52732F-00	.63022E+00	.50624E-00	.10475E+02	0.
4 1 1	-.40131E-05	-.10924F-03	.37230E-03	.64252E-01	-.27720E+01	.23410F-02	.42594E+00	.22927E-02	.21304E+02	0.
4 1 2	-.15452E-04	.66004F-03	.37420E-02	.84707E-03	-.26347E-03	.25263F-00	.48475E+00	.24157E-00	.98171E+01	0.
4 1 3	-.19061E-04	.85919F-03	.49094E-02	.73691E-04	.28054E-02	.34451F-00	.49431E+00	.21042E-00	.99238E+01	0.
4 1 4	-.19050E-04	.92833F-03	.52891E-02	.14842E-02	-.17617E-02	.40910F-00	.47270E+00	.26530E-00	.10076E+02	0.
4 1 5	-.16113E-04	.899370F-03	.50352E-02	-.47533E-03	-.18246E-02	.43821F-00	.38417E+00	.40741E-00	.10241E+02	0.
5 1 1	-.43304E-05	-.10699F-03	.36603E-03	-.54963E-01	-.27433E+01	.23204F-02	.43769E+00	.2737E-02	.21291E+02	0.
5 1 2	-.13331E-04	.65053F-03	.37001E-02	.72117E-03	-.23945E-03	.22248F-00	.46293E+00	.23935E-00	.97089E+01	0.
5 1 3	-.15460E-04	.84350F-03	.48456E-02	.10730E-02	.24105E-02	.26374F-00	.42902E+00	.19050E-00	.98620E+01	0.

RESULTS FOR REEF PLANE (NOTE: I, J LOCATES LARGE SQUARE AND K, L LOCATES SMALL SQUARE.)

K L CODE	DX	DY	DZ	SIGXZ	SIGYZ	SIGZZ	SIGXY	SIGX	SIGY	ENERGY REL.
5 4	-.14422E-04	-.90744E-03	.52076E-02	-.17190E-02	-.32644E-02	.35137E+00	.36398E+00	-.21257E+00	.69542E+01	0.
5 5	-.11324E-04	-.86933E-03	.69422E-02	-.75342E-03	-.21727E-02	.37448E+00	.25497E+00	-.28598E+00	.10033E+02	0.
I= 6 J= 3										
1 1	-.44392E-04	-.89610E-03	.48657E-02	.37997E-02	-.20634E-02	.10745E+01	.26942E+01	-.13719E+01	.12123E+02	0.
1 2	-.12565E-04	-.25144E-03	.80998E-03	-.19002E-00	-.47364E-01	.39639E+02	.20074E+01	.30472E+02	.36429E+02	0.
1 3	.15968E-06	-.21299E-03	.45775E-03	.35404E-03	-.42227E-01	.33349E+02	.94342E+02	.24304E+02	.34845E+02	0.
1 4	.12445E-04	-.25207E-03	.82173E-03	.18095E-00	-.47293E-01	.39041E+02	.20483E+01	.30908E+02	.36823E+02	0.
1 5	.46089E-04	-.89649E-03	.50532E-02	.47590E-03	.20179E-03	.36041E+02	.26883E+01	.22428E+01	.11363E+02	0.
2 1	-.25390E-04	-.81099E-03	.43631E-02	.22595E-02	.25978E-02	.70323E+00	.86662E+00	.13758E+01	.11588E+02	0.
2 2	-.57080E-05	-.17816E-03	.55807E-03	.82327E-01	.37268E-01	.29663E+02	.49408E+02	.27019E+02	.26734E+02	0.
2 3	.30448E-07	.13428E-03	.38549E-03	.65083E-03	.31202E-01	.23843E+02	.26033E+02	.20641E+02	.24292E+02	0.
2 4	.58015E-05	-.17844E-03	.56948E-03	.82745E-01	.37253E-01	.30248E+02	.49408E+02	.27437E+02	.27189E+02	0.
2 5	.25224E-04	-.81115E-03	.45272E-02	.12530E-02	.19585E-02	.84605E+01	.86408E+00	.20238E+01	.11101E+02	0.
3 1	-.15140E-04	.76107E-03	.41291E-02	.16068E-02	.25793E-02	.53235E+00	.33594E+00	.94022E+00	.10914E+02	0.
3 2	-.29280E-05	-.15473E-03	.49294E-03	-.42067E-01	.34030E-01	.27603E+02	.13402E+02	.25958E+02	.26462E+02	0.
3 3	.29828E-07	-.11037E-03	.32264E-03	.58872E-03	-.27878E-01	.21638E+02	.50807E+02	.19909E+02	.21734E+02	0.
3 4	.30460E-05	-.15477E-03	.50333E-03	.42539E-01	.34037E-01	.27962E+02	.11192E+00	.26324E+02	.26794E+02	0.
3 5	.15133E-04	.76128E-03	.42696E-02	.10779E-02	.24509E-02	.79381E+03	.32161E+00	.14552E+01	.10634E+02	0.
4 1	-.95544E-05	.72898E-03	.39992E-02	.13037E-02	.34944E-02	.43922E+00	.15114E+00	.65382E+00	.10909E+02	0.
4 2	-.16623E-05	-.14308E-03	.46312E-03	.23394E-01	.32412E-01	.26582E+02	.40713E+01	.25431E+02	.23638E+02	0.
4 3	.40376E-07	.99478E-04	.29590E-03	.63719E-03	-.26373E-01	.20733E+02	.89429E+02	.19542E+02	.20742E+02	0.
4 4	.17692E-05	.14301E-03	.47232E-03	.24633E-01	.32425E-01	.26901E+02	.15173E+01	.25754E+02	.23794E+02	0.
4 5	.96492E-05	.72898E-03	.41221E-02	.39332E-03	.10190E-02	.60062E+03	.12913E+00	.10895E+01	.10289E+02	0.
5 1	-.60992E-05	.70464E-03	.39112E-02	.31744E-03	.12584E-02	.37669E+02	.72192E-01	.45644E+00	.10240E+02	0.
5 2	-.91649E-06	.13517E-03	.44430E-03	.13491E-01	.31348E-01	.25944E+02	.38644E+02	.25075E+02	.23037E+02	0.
5 3	.59454E-07	.92586E-04	.27999E-03	.78358E-03	-.25442E-01	.25944E+02	.10489E-01	.19314E+02	.20192E+02	0.
5 4	.11104E-05	.13507E-03	.45254E-03	.14604E-01	.31369E-01	.26229E+02	.23214E-01	.25361E+02	.23199E+02	0.
5 5	.64239E-05	-.70482E-03	.40193E-02	.29695E-03	.76141E-03	.17782E+02	.48342E-01	.83725E+00	.10050E+02	0.
I= 6 J= 4										
1 1	.44547E-04	-.10080E-02	.58621E-02	-.33574E-03	-.22259E-02	-.12377E-02	-.17408E-01	-.95793E+00	.96498E+01	0.
1 2	.36677E-04	-.10034E-02	.48917E-02	.19807E-03	-.19301E-02	.20314E-02	-.11190E-01	-.20687E+00	.93489E+01	0.
1 3	.31023E-04	-.90643E-03	.53272E-02	.67887E-03	.93915E-04	.29021E-02	.75937E+00	.15291E+00	.92402E+01	0.
1 4	.21724E-04	-.68760E-03	.39915E-02	.40350E-03	.86521E-03	.17455E-02	.52453E+00	.20309E+00	.93402E+01	0.
1 5	.57273E-05	-.11407E-03	.39948E-03	.79053E-01	-.20304E-01	.24288E-02	.35803E+00	.24004E+02	.21592E+02	0.
2 1	.33172E-04	-.96053E-03	.455338E-02	-.45204E-03	.42775E-03	.25743E-02	.10497E-01	.10489E+01	.10202E+02	0.
2 2	.32274E-04	-.97553E-03	.47158E-02	-.27539E-03	.14694E-02	.12770E-02	.90903E+00	.50153E+00	.97416E+01	0.
2 3	.27492E-04	-.89001E-03	.52275E-02	.11067E-03	.41324E-03	.99799E-03	.70971E+00	.40044E+00	.95403E+01	0.
2 4	.19960E-04	-.67901E-03	.39402E-02	.12343E-03	.79877E-03	.69052E-03	.53442E+00	.35805E+00	.95192E+01	0.
2 5	.54903E-05	-.11274E-03	.39384E-03	.74095E-01	-.20144E-01	.24115E+02	.40909E+00	.23734E+02	.21494E+02	0.
3 1	.23375E-04	-.92374E-03	.53416E-02	-.54003E-03	.18814E-02	.87118E-03	.63442E+00	.10059E+01	.10102E+02	0.
3 2	.23404E-04	-.95138E-03	.55698E-02	-.43405E-03	.23821E-03	.80290E-03	.66425E+00	.69599E+00	.98734E+01	0.
3 3	.23282E-04	-.87474E-03	.41346E-02	-.53705E-05	.33999E-03	.46428E-03	.60933E+00	.52271E+00	.96942E+01	0.
3 4	.17871E-04	-.67053E-03	.38887E-02	.12539E-03	.79689E-04	.31254E-03	.53444E+00	.45134E+00	.96292E+01	0.
3 5	.51783E-05	-.11123E-03	.39175E-03	.71940E-01	-.27967E-01	.23929E+02	.38442E+00	.23479E+02	.21494E+02	0.
4 1	.16544E-04	-.89484E-03	.31958E-02	-.31127E-03	.17889E-02	.27452E-03	.38442E+00	.66245E+00	.10037E+02	0.
4 2	.19594E-04	-.92954E-03	.54530E-02	.22731E-04	.41668E-02	.59476E-03	.44486E+00	.66245E+00	.98499E+01	0.
4 3	.19312E-04	-.85960E-03	.50512E-02	.31630E-03	-.21962E-03	.11381E-02	.51424E+00	.54204E+00	.97369E+01	0.
4 4	.15714E-04	-.66140E-03	.38383E-02	-.45566E-04	.18887E-03	.55891E-03	.50486E+00	.48199E+00	.96794E+01	0.
4 5	.44232E-05	-.10941E-03	.38130E-03	.66765E-01	.27740E-01	.23720E+02	.44424E+00	.23245E+02	.21532E+02	0.
5 1	.11877E-04	-.87064E-03	.50847E-02	-.67898E-03	.55740E-03	.60647E-03	.25803E+00	.64542E+00	.98821E+01	0.
5 2	.14983E-04	-.90917E-03	.53545E-02	-.65864E-04	.91547E-04	.37609E-03	.37288E+00	.56431E+00	.97826E+01	0.

MESA IS FUR REEF PLANE (NOTE: I-J LOCATES LARGE SQUARE AND K-L LOCATES SMALL SQUARE.)

K L CODE	OA	DY	OZ	SIGAZ	SIGYZ	SIGZZ	SIGAY	SIGMX	SIGVY	ENEMY REL.
5 3	15627E-04	-84409E-03	69741E-02	27940E-03	-66736E-03	-99470E-03	-44428E+00	-49469E+00	97099E+01	0.
5 4	13627E-04	-65129E-03	37879E-02	-36542E-03	64367E-04	69717E-03	-44400E+00	-45987E+00	96764E+01	0.
5 5	43659E-05	-10719E-03	37634E-03	60301E-01	-27459E+01	23697E+02	-65874E+00	23027E+02	21634E+02	0.
I= 6 J= 5										
1 1	27714E-05	-45859E-04	14515E-03	38603E-01	-18434E+01	15388E+02	-17668E+00	15221E+02	17009E+02	0.
1 2	17808E-05	-26730E-04	83152E-04	24750E-01	-16180E+01	13218E+02	-14049E+00	12996E+02	15971E+02	0.
1 3	13254E-05	-18570E-04	57587E-04	14399E-01	-15047E+01	12324E+02	-12782E+00	12052E+02	15573E+02	0.
1 4	10114E-05	-14210E-04	44204E-04	14805E-01	-14440E+01	11955E+02	-13432E+00	11542E+02	15380E+02	0.
1 5	85208E-06	-10929E-04	36925E-04	12013E-01	-13087E+01	11530E+02	-13099E+00	11185E+02	15250E+02	0.
2 1	27825E-05	-65553E-04	14389E-03	38954E-01	-18817E+01	15366E+02	-22270E+00	15167E+02	17041E+02	0.
2 2	18845E-05	-26653E-04	82730E-04	26358E-01	-16194E+01	13254E+02	-16810E+00	12986E+02	16011E+02	0.
2 3	14510E-05	-18530E-04	57410E-04	20522E-01	-15088E+01	12339E+02	-16910E+00	12600E+02	15609E+02	0.
2 4	12014E-05	-14184E-04	44100E-04	16528E-01	-14662E+01	11873E+02	-16033E+00	11559E+02	15409E+02	0.
2 5	95024E-06	-10909E-04	34869E-04	13413E-01	-14010E+01	11550E+02	-15778E+00	11206E+02	15277E+02	0.
3 1	27762E-05	-45074E-04	14227E-03	38925E-01	-18781E+01	15331E+02	-25657E+00	12969E+02	17066E+02	0.
3 2	15829E-05	-26459E-04	82042E-04	27711E-01	-16196E+01	13223E+02	-22343E+00	12969E+02	16043E+02	0.
3 3	13242E-05	-14133E-04	57066E-04	22106E-01	-15082E+01	12346E+02	-20300E+00	12041E+02	15639E+02	0.
3 4	10114E-05	-10842E-04	43911E-04	14367E-01	-14482E+01	11808E+02	-19183E+00	11549E+02	15441E+02	0.
3 5	85208E-06	-10929E-04	36925E-04	14953E-01	-14033E+01	11568E+02	-18195E+00	11221E+02	15380E+02	0.
4 1	20504E-05	-64376E-04	14017E-03	38232E-01	-18711E+01	15279E+02	-20944E+00	15011E+02	17043E+02	0.
4 2	16804E-05	-18288E-04	80936E-04	26734E-01	-16171E+01	13204E+02	-25651E+00	12946E+02	16099E+02	0.
4 3	14473E-05	-13999E-04	56390E-04	23620E-01	-15078E+01	12347E+02	-23427E+00	12054E+02	15643E+02	0.
4 4	11694E-05	-10842E-04	43911E-04	14375E-01	-14080E+01	11895E+02	-22103E+00	11571E+02	15467E+02	0.
4 5	26361E-05	-63402E-04	13745E-03	36692E-01	-14080E+01	15206E+02	-20932E+00	14989E+02	17035E+02	0.
5 1	20574E-05	-25509E-04	79271E-04	28719E-01	-16114E+01	13169E+02	-29194E+00	12914E+02	16096E+02	0.
5 2	17339E-05	-17825E-04	85244E-04	24216E-01	-15948E+01	12328E+02	-26968E+00	12034E+02	15672E+02	0.
5 3	15049E-05	-13713E-04	42643E-04	20787E-01	-14476E+01	11887E+02	-25049E+00	11562E+02	15489E+02	0.
5 4	12219E-05	-10612E-04	33906E-04	17308E-01	-14048E+01	11501E+02	-23517E+00	11228E+02	15348E+02	0.
I= 7 J= 3										
1 1	31484E-05	-68129E-03	38263E-02	53840E-03	-10602E-02	31810E+00	-86072E-01	-18660E+00	9897E+01	0.
1 2	32332E-06	-12684E-03	42408E-03	48234E-02	-30215E+01	25259E+02	-55285E-01	24834E+02	22289E+02	0.
1 3	10114E-05	-10842E-04	43911E-04	10808E-02	-24421E+01	19585E+02	-12720E-02	19176E+02	19436E+02	0.
1 4	54766E-06	-12684E-03	43147E-03	74203E-02	-30225E+01	25516E+02	-62493E-01	25089E+02	22420E+02	0.
1 5	25750E-05	-88181E-03	39222E-02	58730E-03	-17226E-03	12754E+02	-71643E-01	-51619E+00	97493E+01	0.
2 1	23027E-05	-67319E-03	38089E-02	40812E-03	-99612E-03	29515E+02	-36133E-01	15856E+00	98605E+01	0.
2 2	21953E-06	-12497E-03	42154E-03	33544E-02	-29978E+01	25182E+02	-28881E-01	24761E+02	22282E+02	0.
2 3	16079E-06	-83743E-04	26040E-03	13532E-02	-24263E+01	19552E+02	-39816E-03	19128E+02	19454E+02	0.
2 4	64608E-06	-12504E-03	42834E-03	63258E-02	-29999E+01	25430E+02	-32426E-01	24966E+02	22403E+02	0.
2 5	28387E-05	-67391E-03	38977E-02	27955E-02	-29999E+01	12935E+02	-38452E-01	24966E+02	97189E+01	0.
3 1	18609E-05	-66757E-03	41963E-03	21601E-03	-48627E-03	25147E+02	-20922E-01	13334E+00	98441E+01	0.
3 2	15449E-06	-82743E-04	25897E-03	24094E-02	-29809E+01	19523E+02	-67534E-03	24722E+02	22272E+02	0.
3 3	11329E-06	-82743E-04	25897E-03	19411E-02	-24150E+01	19523E+02	-67534E-03	19099E+02	19459E+02	0.
3 4	24994E-06	-12370E-03	42604E-03	57903E-02	-29836E+01	25371E+02	-20722E-01	24966E+02	22386E+02	0.
3 5	25094E-05	-66859E-03	38833E-02	10533E-02	-44160E-03	83322E-03	-22003E-01	-33398E+00	97661E+01	0.
4 1	15247E-05	-66144E-03	37855E-02	19556E-03	-5150E-03	27799E+02	-20449E-01	11008E+00	98197E+01	0.
4 2	80809E-07	-12190E-03	41477E-03	12386E-02	-29602E-01	25089E+02	-16750E-02	24684E+02	22227E+02	0.
4 3	12751E-06	-81505E-04	25665E-03	17347E-02	-23997E+01	19464E+02	-16750E-02	24684E+02	19429E+02	0.
4 4	38343E-06	-12210E-03	42289E-03	52952E-02	-29636E+01	25284E+02	-20932E-01	24684E+02	22337E+02	0.
4 5	22744E-05	-64282E-03	38661E-02	67634E-04	-66733E-03	32703E+03	-17973E-01	-39351E+00	96854E+01	0.
5 1	11191E-05	-65321E-03	37621E-02	96972E-04	-24622E-03	26631E+00	-27452E-01	-61761E+01	97730E+01	0.

RESULTS FOR REEF PLANE (NOTE: I,J LOCATES LARGE SQUARE AND K,L LOCATES SMALL SQUARE.)

K L CODE	DA	DY	DZ	SIGXZ	SIGYZ	SIGZT	SIGXY	SIGXK	SIGYY	ENERGY REL.
5 2	.31724E-07	-.11952F-03	.61205E-03	.27723E-03	-.29300E-01	.24925F-02	-.33134E-01	.24568E-02	.22130E-02	0.
5 3	.14901E-06	-.79616E-04	.25283E-03	.20781E-02	-.23763E-01	.19352F-02	-.25458E-02	.18989E-02	.19351E-02	0.
5 4	.33736E-06	-.11941E-03	.41798E-03	.44055E-02	-.29348E-01	.25132F-02	.28757E-01	.26774E-02	.22234E-02	0.
5 5	.20631E-05	-.65513F-03	.38399E-02	.89052E-04	-.56231E-03	-.30022F-03	.21414E-01	-.33373E-00	.96451E-01	0.

CP TIME TO CALCULATE REEF STRESSES AND PRINT RESULTS= 23.216

CP TIME FOR MINING STEP 3 = 11A.735

CP TIME TO EXECUTE ALL MINING STEPS= 335.120

CP TIME TO EXECUTE MINTAB= 335.260